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Editorial

A naturalist, according to the Oxford dictionary definition, is 'one who makes a special study of animals or plants'. Geology and the study of fossils doesn't get a mention however. This issue of *Nature in Avon* certainly shows us that the definition should be very much wider and gives a fascinating commentary on the activities of naturalists around Bristol.

Gill Brown provides a delightful detailed study of otters living in the Land Yeo (I have lived close to the Land Yeo for 20 years and never knew they were there!). Des Bowring has studied his local patch in Montpelier and reports on an amazing array of wildlife on his doorstep. Richard Bland has been walking several local pathways and provides a detailed and sometimes surprising account of the plants he found. Richard Ashley has spent time on the shore at Clevedon and explains how the curious Liesegang Rings are formed.

Recording is an important part of what naturalists do and Ray Barnett gives us a full report of the local invertebrate life around Bristol. Mark Pajak reports on the astonishing diversity of Bristol spiders with fascinating details of how tricky they are to identify. Not all of us would be keen to try of course – I read today that there is even a phone app. to combat arachnophobia (lots of pictures of spiders every day!).

Most naturalists are involved in some kind of conservation work and Rupert Higgins has been monitoring the restoration of meadows at Folly Farm and Dolebury Warren. Clare Dinham reports on B-Line which encourages the restoration of meadow species to halt the loss of our pollinators.

Naturalists have an vital role in educating and enthusing the public, and in particular interesting young people in the natural world. Alex Morss gives an exciting glimpse of what can be achieved when experts and the public get together to record the local wildlife. The University Botanic Garden is also very much involved in education and Nick Wray gives us an account of what is involved in setting up a new botanic garden with a strong educational remit.

Monitoring the effects of climate change is also part of the naturalist's role and Richard has provided in-depth analysis of recent trends in our weather and the effects that he has observed on wildlife.

I hope you enjoy this issue. I would like to thank the Editorial Committee for their invaluable assistance and Richard Bland for his encouragement and help.

Dee Holladay

The Otters of the Land Yeo – A personal view

Gill Brown

When we bought our home in Nailsea 25 years ago it was the location that sold it to us. Situated on the edge of the town it looked over the Land Yeo valley towards a wooded limestone ridge.

At first I was too preoccupied with work, then a young family, to explore the area as much as I would have liked, or to learn much about the wildlife. As the children grew that began to change. I remember family dog walks along the Land Yeo encouraging the children to look out for otters in the river. At the time I had no idea they were there, and it was nothing more than a bit of fun with a liberal dose of wishful thinking.



The Land Yeo

I now know there are records for the area dating back to 1987, three years before we arrived, but coming from Essex, an area devoid of otters, I had no idea that they were beginning to gain a foothold in the West Country. It wasn't until 2005 when I caught a brief glimpse of an otter on Backwell Lake that I realised that they could be found in so close to home.

After that sighting I found out about the North Somerset Otter Group and trained as a surveyor. This was when I discovered that there were records of otters on 'my' stretch of the Land Yeo. I began to hear of sightings then, sadly, a large dog otter was killed on the road at Wraxall Manor. He was such a splendid specimen that a licence was obtained for possession and taxidermy for educational purposes. I borrowed him for a week to illustrate some talks and he took up the whole of my living room sofa.



'The Nailsea Otter' on my sofa

From then onwards I became more and more aware of the otters of the Land Yeo. I was delighted the first time I discovered spraint on the stones under the aluminium bridge which I crossed with my dog almost every day, then had the sad task of retrieving an otter that had been run over at Jacklands Bridge for the Cardiff University Otter Project. It was so flattened that it resembled an old fashioned ladies stole with head, feet and tail attached. Not my first otter casualty, but one of the saddest. Fortunately it wasn't too long before otter signs began to appear on the river again. Occasional spraints indicated the presence of at least one animal, then in April 2012 I was out with a more experienced otter-surveying friend who spotted a holt. I had passed it on many occasions, but failed to notice the tell tale signs.

It was some time before I saw footprints, although I regularly checked the mud at the river's edge when the water level was low enough. The first I encountered came as something of a surprise, mainly because I wasn't yet familiar with the habits of otters. I was walking along the riverside footpath with my dog on a frosty morning in December 2012 when I noticed an unusual impression in a patch of ice. It looked like it was made by an otter, but I didn't trust my instincts because I didn't think they strayed that far from the water's edge. A few yards further on I found another print – this time it was unmistakable, it was 10cm long, evidently made by a large animal which I presumed to be a male. I mentioned it to Claire Shellis, a colleague who surveyed the river upstream, and she said she had noticed similar riverside footprints on the same day.

The next development came when another friend offered me the use of her trail camera. With permission from the landowner we attached it to a waterside tree about 30m downstream from the holt. We checked the SD card three days later and as we went through the images we were delighted to find several of a small otter swimming upstream towards the camera. Encouraged by this we changed the setting from stills to video. I was amazed by what we found.



Icy Otter footprint on the riverbank

I had assumed the holt was one of several lying up places, too close to the path and passing dog walkers for an otter to raise cubs safely. I couldn't have been more wrong; amongst the videos we recorded there were several of a disappearing tail, a couple of the otter scrambling out of the water, and one with an almost indistinguishable movement at the bottom right hand corner of the frame. I replayed it several times and was eventually able to make out our otter, this time followed by two very young cubs.



Footprint of female Otter

Unfortunately I had to return the trail camera, but Claire, who has had many years of surveying experience, and I used field signs to follow the progress of the family. We were fortunate that the female had a distinctive foot print with a ‘wonky’ toe which made this much easier than it might otherwise have been. One cub moved upstream towards Barrow Gurney towards the end of its first year, but the other stayed with its mother for several months longer, Claire was lucky enough to see them fishing together in a weir pool shortly before they separated.



Trailcam image of Otter at Jacklands Lake

Eventually I bought my own trail camera, and was asked by the owners of Jacklands Fishing Lakes if I would like to set it up there. Before long I had footage of a much larger otter, presumably the one responsible for the big footprints, and the siring of the cubs. Interestingly on a couple of occasions it was followed by a very sleek fox which appeared to be scavenging the remains of any fish it had left. This was probably the explanation for a dead trout that had been found abandoned on a footpath in Towerhouse Wood.

In December 2014 I noticed the distinctive footprint of our female otter showing that she had crossed from the Land Yeo to a rhyme that led to her natal holt. I went back to check the spot every day, and on a very frosty morning, between Christmas and the New Year, I saw tiny prints on a wooden platform close by. I stared at them in disbelief for a few minutes before it slowly dawned that there were new cubs; it was possibly one of the best Christmas presents that I had ever had.



Cub footprints in the frost

It wasn't possible to tell how many cubs there were from the prints so I set up the camera in the same place as before to see if I could find out. Mother and cubs appeared to have moved on, but I did capture footage of a new otter, somewhere in size between the female and the large male. Given that it was quite big, and knowing that the original male was still in the area and unlikely to tolerate an interloper, I thought it could have been a male cub from the first litter, although without DNA testing it would have been impossible to tell.

In the weeks that followed Claire started finding mother and cub footprints on her stretch of the river, in the same locations as before. Then, in April 2015 I heard a report of a mother and two cubs a mile or so downstream, near Tickenham Church. I thought it unlikely that there were two breeding females in such close proximity, so I took this as evidence that 'Wonky Toc' had had two cubs.

In June I took a phone call reporting a dead otter on Church Lane, Tickenham. When I went to retrieve it I was relieved to find it was a cub. Although sad, this was a far better outcome than the death of the mother whose offspring would have been unlikely to have survived without her. When I checked the cub over it was smaller,

and younger looking, than I expected, and I began to wonder if there was more than one family on the river after all.

The question was finally resolved in July when I was chatting to one of the owners of the fishing lakes. She had told me previously that she was sure they were being visited by two families of otters, one from upstream and one from downstream, which seemed to fish in different areas. I had been sceptical, but this time she said that she had seen an otter with two cubs at five o'clock that morning and heard them whistling to each other. It was enough to convince me that there were, indeed, two adult females converging on the lakes, otherwise there would only have been one cub.

The apparent lack of territoriality at the fishing lakes might be due to the abundance of food (there is little to be gained by risking injury to defend a resource that isn't limited), but it is also possible that the resident female is more tolerant than she might otherwise have been because the 'intruder' is a cub from a previous litter. I would like to believe that she is one of the 'trail camera' cubs, but without additional evidence it's no more than speculation.

Since I moved to Nailsea I have progressed from not knowing that there were wild otters resident in North Somerset to having a privileged insight into the life of a family of these elusive animals living almost on my doorstep. I have learned a great deal, some of my preconceptions have been challenged, and there are still questions to be answered. I have had moments of excitement, sadness and joy, and I hope that I will continue to discover more about the lives of the otters on the Land Yeo for many years to come.

Liesegang Rings on Clevedon Beach

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Abstract

The purpose of this paper is to record the occurrence of Liesegang Rings in Triassic and Devonian Rocks on Clevedon Beach adjoining the Clevedon Pier Fault, Clevedon, North Somerset, and to consider their origin in the context of the geology of the area.

Introduction

The phenomenon of Liesegang Rings or Bands, in a geological context, is most usually observed in the bands of iron staining that occur in York stone or similar natural paving slabs. These bands mainly take the form of segments of a circle but some are straight. There are some examples in the pavements on the north side of College Green, Bristol. They can also be seen in banded ironstone nodules from sandstone formations such as the Lower Greensand in the Weald of south-east England (Gahan 2009). It should be emphasized that the rings are not just superficial markings on bedding planes but are three-dimensional structures that form an integral part of the rock.

Wikipedia, the online free encyclopedia, describes Liesegang Rings as “colored bands of cement observed in sedimentary rocks that typically cut across bedding. These secondary (diagenetic) sedimentary structures exhibit bands of (authigenic) minerals that are arranged in a regular repeating pattern. Liesegang Rings are distinguishable from other sedimentary structures by their concentric or *ring-like* appearance. The precise mechanism from which Liesegang Rings form is not entirely known and is still under research, however there is a precipitation process that is thought to be the catalyst for Liesegang ring formation referred to as the Ostwald-Liesegang supersaturation-nucleation-depletion cycle.”

The Rings are named after the German chemist Raphael Eduard Liesegang who in 1896 found that a drop of silver nitrate placed on a flat layer of gel infused with potassium chromate solution produces dark deposits of insoluble silver chromate in concentric rings. There are a wide variety of chemical processes that can result in the formation of Liesegang rings and some fairly exotic results can be achieved in laboratory experiments. But the formation of bands of iron staining on stone generally involves the diffusion of oxygenated surface water into subterranean water containing soluble ferrous iron. The oxygen ions react with the soluble ferrous iron to form iron hydroxide in a solution that becomes supersaturated until a point where concentration is high enough to trigger crystal formation (nucleation) is reached;



Fig.1: Liesegang Rings and stylolites marked with manganese oxide



Fig.2: Liesegang Rings showing complex internal structure

then almost all the iron hydroxide is precipitated in a band in the rock and the concentration remaining in solution drops below the threshold (depletion). As the diffusion process continues a new supersaturation cycle builds back up to nucleation by which time the diffusion front has moved on and the next band is formed in a different position parallel to the first.

Geology of Clevedon Pier Beach

Underlying Clevedon Pier Beach and generally exposed on the lower part of the shore are the Shirehampton Beds that mark the transition between the continental sandstones of the Portishead Beds of the Devonian and the fully marine Lower Limestone Shales of the Carboniferous periods. The Shirehampton Beds consist of sandstones, shales and limestones and have an increasingly marine aspect as one goes up the succession. It is not possible to determine precisely where the top of the Devonian and the base of the Carboniferous lies as this is determined elsewhere on evidence from goniatites that unfortunately do not occur here. The Shirehampton Beds dip at approximately 30 degrees to the south-south-east. Underlying the boat-launching slipway is the Bryozoa Bed, consisting of a reddish crinoidal limestone, which marks the top of the Shirehampton formation. Above this is a succession of grey/green and reddish shales with thin limestone bands known as the Lower Limestone Shales.

Near the Pier the Shirehampton Beds are overlain unconformably in places by a bed of creamy yellow carbonate rock of Triassic age. This bed was almost certainly laid down in a shallow lake and is referred to hereafter as the lacustrine limestone. It is for the most part fine grained but does include larger fragments derived from elsewhere. It gives the appearance of having been dolomitized; that is the replacement of some of the calcium carbonate by magnesium carbonate. Magnesium carbonate has less volume than the calcium carbonate that it replaces, resulting in the development of small voids in the rock and stylolites. Stylolites are irregular suture-like contacts formed where rock is dissolved away under pressure.

Above the lacustrine limestone bed are patches of hard red sandstone. These are usually only a few centimetres in thickness although the bed may have originally been thicker before being worn down by erosion. The bed seems to have been silicified at some stage, as the sandstone is almost a quartzite. The contact between the lacustrine limestone and the sandstone is not flat and it is possible that the top of the lacustrine limestone was rippled before the succeeding bed was laid down, possibly as a deluge event. However there is not enough of the interface exposed to be certain of this. Also visible in places are small areas of greenish grey mudstone that have the aspect of what used to be known as the Tea Green Marl in what is now the Blue Anchor Formation of the Mercia Mudstone Group. In places these appear to underlie the lacustrine limestone but in others they appear to overlie it. It seems



Fig.3: Pair of Liesegang Rings

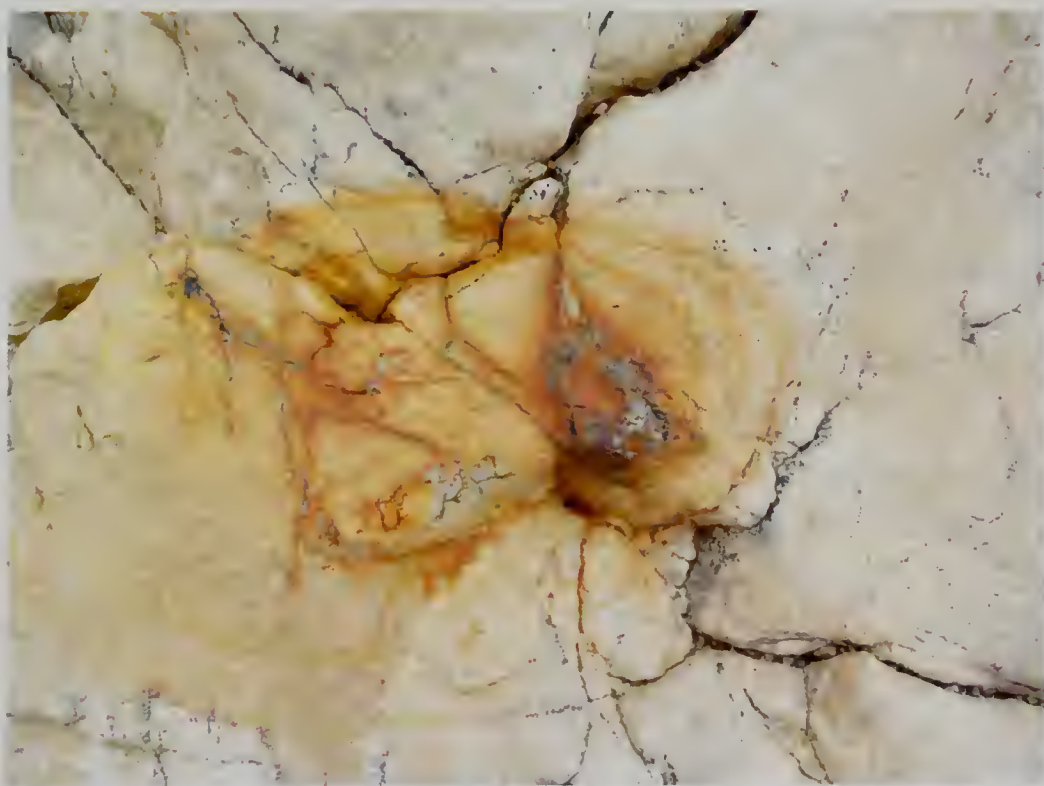


Fig.4: Liesegang banding originating from iron minerals in lacustrine limestone

likely that the Mercia Mudstone, which is also a lacustrine deposit, originally overlay the lacustrine limestone. In not so distant South Wales shoreline clastic rocks and carbonates grade laterally and vertically into the Mercia Mudstone facies (Tucker 1978).

At the north end of the beach near the Pier there is a cliff that is the hanging wall of a fault referred to in this paper as the Clevedon Pier Fault. This follows the nomenclature used by Andrew Mathieson in an article in the Avon RIGS Group newsletter “Outcrop” relating to minerals found when the promenade was being reconstructed.

The Clevedon Pier Fault and its Mineralization

The Clevedon Pier Fault and the adjoining area of beach is a Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981. The Natural England citation states: “The Clevedon Shore SSSI, Somerset is an important site for mineralogy. Barium, lead, zinc and copper mineralization is associated with a faulted unconformity between Upper Palaeozoic sandstones and shales and Triassic Dolomitic Conglomerate. The site is noted for the occurrence of a number of relatively rare secondary minerals which have formed by the reaction of the original primary minerals with sea water.” It is classed by Natural England as a finite site that should not be collected from, but material has been so extensively collected away over the years that now there is really very little to see of the mineralization of the fault apart from a few patches of Barytes and some mineralization of the rocks adjoining the fault. This consists principally of inclusions of manganese oxide (Pyrolusite) in the form of small spicules in the body of the lacustrine limestone and along the stylolites together with small patches of Galena (lead sulphide) and copper minerals. The Liesegang Rings also occur in both the Portishead Beds and the Triassic lacustrine limestone adjoining the fault.

It is likely that the fault had its origins in the Variscan (Hercynian) Orogeny that took place towards the end of the Carboniferous and beginning of the Permian periods when the Mendips and the Clevedon/Gordano Ridge were formed. Movement along the fault must have continued subsequently as it affects the Dolomitic Conglomerate that was formed a considerable time after the Variscan Orogeny. The fault is a transcurrent or slip strike fault with considerable lateral movement. For a detailed account of the Clevedon Pier Fault and its mineralization see the paper by Ixer *et al.*, (1993).

Stanton (1981) proposed that the lead-zinc-silica mineralization of the Mendip area was associated with the development of deep-seated rifting that took place in the central Somerset/Bristol Channel area during Triassic and early to middle Jurassic times. This had the effect of opening up suitable fissures for mineralization and providing a source of hot ore fluids that rose from great depths up faults



Fig.5: Liesegang Rings and stylolites marked with manganese oxide



Fig.6: Triassic lacustrine limestone exposed on Clevedon foreshore
28 July 2015

associated with the later stages of rift valley formation. He drew attention to the fact that hot mineral springs are a feature of rift valleys today. There is no reason to believe that the mineralization of the Clevedon Pier fault had any different origin from the mineralization of the Bristol/Mendip area generally although the copper minerals occurring are unusual in the Bristol area.

The Occurrence and Character of Liesegang Rings in the vicinity of Clevedon Pier Fault

As stated above the Liesegang Rings are found on both sides of the fault so that it is reasonable to assume that they are in some way associated with its mineralization but it has to be said that they can be seen up to 50 metres to the west of the fault where there is little sign of mineralization apart from some manganese oxide. The possibility that the iron minerals are derived from another source such as iron pyrites in hypothetically overlying Westbury Beds cannot be discounted.

In the sandstone of the Portishead Beds the Liesegang Rings have the appearance of being rusty ring-shaped smudges on the rock but in the fine grained lacustrine limestone they can be seen in all their exquisite detail. They look particularly good when left wet by a receding tide. As can be seen from the sealed photographs they are not particularly big, the largest being in the region of 10-12 centimetres across but many are much smaller. A common feature is a distinct outer ring or rings referred to by Chan *et al.*, (2007) in their account of their laboratory experiments as “the rind”. Inside is a series of thinner less distinct rings. These may take the form of groups of separate rings or even look like the petals inside a transversely sectioned rose bud. The rings grow inward from the rind by means of successive chemical reaction cycles, which is why they tend to become congested. They also tend to become fainter as the soluble iron minerals are used up. Compared to Liesegang Rings that are found elsewhere the Clevedon rings are really very small. It seems reasonable to assume that the size of the rings is directly related to the amount of soluble iron available.

Commenting on a photograph of one of the rings Professor Maurice Tucker said that it was ‘formed after the stylolites, so it is very late – probably related to the weathering and oxidation of ferrous iron minerals in the host limestone being converted to hydrated iron oxides/hydroxides (limonite/goethite)’. The conclusion must therefore be that the Clevedon rings were formed in geologically recent times when the rocks and the minerals in them were exposed to oxygenated sea and rainwater and that there may have been no contribution from de-oxygenated ground water.

Acknowledgements

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References

- Ball P. *Shapes – Nature's Patterns*. Oxford University Press 2009.
- Chan M.A., Ormo J., Park A.J., Stich M., Souza-Egipsy V., Komatsu G. *Models of iron oxide concretion formation: field, numerical, and laboratory comparisons*. *Geofluids* (2007) 7, 1-13.
- Gahan J. *The nature and origin of ferruginous "Carstone" development at Mellow Farm Quarry (Dockenfield), Western Weald, Hants*. Farnham Geological Society Newsletter February 2009.
- Ixer R.A., Pattrick R.A.D., Starkey R.E. *Lead-Zinc-Copper-Arsenic-Baryte Mineralization from Clevedon, near Bristol, England*. *Journal of the Russell Society*, 5(1). 23-30 (1993).
- Kellaway G.A., Welch F.B.A. *Geology of the Bristol district Memoir for 1:63,360 geological special sheet*. London HMSO 1993.
- Stanton W.I. *The Age and Origin of Lead-Zinc-Silica Mineralization of the Mendip Area*. *Proceedings of the Bristol Naturalists' Society* (1981), 41: 25-34.
- Starkey R.E. *Phosgenite from Clevedon, Avon*. *Proceedings of the Bristol Naturalists' Society* (1984), 44: 13-14.
- Tucker M.E. *Triassic lacustrine Sediments from South Wales: shore zone, clastics, evaporates and carbonates*. In 'Modern and Ancient Lake Sediments' *Spec. Publs int. Ass. Sediment* (1978) 2, 205-224.
- Tucker M.E. *Sedimentary Petrology* 3rd edition 2001.

The Plants of Urban Footpaths

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Urban footpaths are a very interesting and special habitat that I have been surveying. They have a number of important characteristics. They are geographically fixed and defined, are linear, are always accessible, and are minimally managed. They thus form an ideal habitat for monitoring plant population change in urban areas, something which would parallel the Breeding Bird Survey which the British Trust for Ornithology (BTO) has established as a key indicator of avian population change. 124 paths were walked, lying within 43 one-km squares of the city of Bristol and totalling 30km in length. 4400 plant records of 345 species, of which 53 were trees or woody species. Plants were recorded if they were growing inside the path boundary. This was sometimes very clear, as the boundary was a wall or a fence of some kind. If it was a hedge I recorded the plants in the bottom of the hedge, and some paths without boundaries I recorded within a metre either side. Paths varied in width from a metre to four metres. Most, though not all, were paved in some way at least across part of the path.

Management of paths is simple. Some are trimmed, mown or poisoned once, or perhaps twice, a year, some are entirely neglected. Occasionally there is radical change, paving is modernised, boundaries are renewed, and a new generation of plants begins to become established. But for the most part paths are left to themselves. Some are very ancient – the oldest I have walked is Roman. Some are abandoned roads, some are new cycle paths. I have limited myself to sites that are either inaccessible to vehicles, or only used for access to garages, and have ignored paths through parkland. Paths are often deeply shaded because remnant hedges overshadow them, or they are defined by high walls. They are also effective green corridors, and often are dumping grounds for garden rubbish, and hence conduits between gardens and the wild, aiding the spread of alien species.

Paths vary greatly in their length, from around 50 metres to 1000, but average 250 metres, with an average of 34 species a path. Some paths have names, but I have invented names for many. Some paths have been split into sections with markedly different habitat. Some paths are botanically rich, some very poor, and the number of species on each path, regardless of length, has varied from zero to 100. Very few paths have had second visits, though these always add significantly to the species total. To rate the paths I have divided the length of the path by the number of species, to produce a rate of metres per species. The average is 7 metres per species, the extremes zero to 27.

The least productive paths were predictably those in the city centre. Tower Lane and St Leonards Lane had no plants at all. Christmas Steps, Zed Alley and St Johns Lane less than five, but they were the only paths to have Gallant Soldiers.

Table 1 lists the ten most productive paths in terms of total species found. They are all above average in length, and the column showing the ratio is calculated by dividing the length by the number of species. It is thus a better indication of species richness, and the lower it is the richer the path.

Name	Length	Species	Ratio	Area	Grid Ref
Ebenezer Lane	640	98	6.5	Stoke Bishop	ST5595 7666
Mariners Path	430	94	4.6	Stoke Bishop	ST5588 7555
Round Tesco	660	79	8.4	Henleaze	ST5853 7672
Ashton Vale cycle path	590	77	7.8	Ashton Vale	ST5664 7186
Hollybush Lane 3	210	73	2.9	Stoke Bishop	ST5624 7609
Hollybush Lane	460	70	6.6	Stoke Bishop	ST5657 7578
Southmead path	570	69	8.3	Southmead	ST5932 7761
St Johns Lane north	720	68	10.6	Eastville	ST6086 7618
Boiling Wells lane	500	65	7.7	Eastville	ST6015 7544
Bramble Drive	200	64	3.1	Sneyd Park	ST5535 7527

Table 1: The paths that had the largest number of species. The grid reference is the central point.

The plant species

Just nine species were present in more than 50% of the paths, and all of them were common plants in the region, recorded as present in more than 75% of the one-km squares in the Flora 2000. 26 species were present in between 25% and 50% of the paths, and the remaining 256 species were present in fewer than 25%. 223 species were present in less than 10% and 57 plant and 13 tree species were only found once; 41 plants and 5 tree species only twice. A few species that are strikingly common in the region were rare on paths, including Ground Ivy, Yarrow, Red and White Clover, Creeping Thistle, Meadow Buttercup, Woody Nightshade, Red Deadnettle, Silverweed, Spear Thistle, Sorrel, Common Field Speedwell, Self Heal, Creeping Buttercup and Ribwort Plantain.

Less common species

Table 2 lists 22 species that are rare in the region. Stinking Tutsan, found in two paths in St Werburg, was apparently last seen in 1905, but is flourishing in Ashley Vale. Milk Thistle was found, mown back alas, in Braydon Path in Bradley Stoke. It was only found in a single site in the Flora. Salsify was found in Canford, and Skullcap at the top of Hollybush Lane. There were three fine plants of Vipers Bugloss in Ebenezer Lane in Stoke Bishop. Nettle-leaved Bellflower was in the Cannington Reserve path. Yellow Loosestrife, Sanicle, Fennel, Caper Spurge and

Rosy Garlic were found twice. Chicory was in abundance on part of the new Concorde Way cycle path. Italian Lords and Ladies was on three paths, Lungwort, Rose of Sharon, Pink Sorrel and Ivy Broomrape were found on four paths, and Mind Your Own Business on five. The delightful spreading Fox and Cubs and Three-cornered Garlic in seven and Tutsan in ten. Many of these are new records for the city.

	Paths	Bristol sites
Caper Spurge	2	10
Chicory	2	10
Fennel	3	34
Fox and Cubs	7	0
Gallant Soldiers	2	0
Italian Lords and Ladies	3	3
Ivy Broomrape	4	26
Lungwort	4	4
Milk thistle	1	0
Mind your own Business	5	12
Nettle-leaved Bellflower	1	0
Pink Sorrel	4	11
Rose of Sharon	4	10
Salsify	1	2
Sanicle	2	11
Skullcap	1	6
Stinking Tutsan	2	0
Three cornered Garlic	7	0
Tutsan	10	10
Vipers Bugloss	1	1
Yellow-flowered Strawberry	2	3
Yellow Loosestrife	2	1

Table 2: 22 less common species showing the number of paths in which they were found, and the number of Bristol sites in Flora 2000.

Aliens

56 species were of garden origin, though some of them are very well established in the wild. The commonest was Spanish Bluebell found in 31% of paths, followed by Trailing Bellflower in 25%, mostly associated with walls. Adria Bellflower was

only found in 8%. 17 species were only found once, and the general impression was that even when paths were used for garden rubbish, few species actually survived. Japanese Knotweed was found on six paths, Virginia Creeper and *Leycesteria formosa* in four, Italian Lords and Ladies flourished in three, Bears Breeches was found twice, and one path had masses of *Pittosporum* seedlings. A wide variety of *Cotoneaster* species were present.

Spanish Bluebell	31
Trailing Bellflower	25
Cotoneaster sp	13
<i>Lonicera nitida</i>	10
Pyracantha	9
Opium Poppy	8
Adria Bellflower	8
French Geranium	8
Mexican Daisy	7
Russian Vine	6

Table 3: The ten most frequent alien species

Trees

I recorded trees as either mature or seedling/sapling. Some paths are wide enough to have major trees growing within the boundary, especially on paths that had previously been lanes, but a majority of paths had seedling or sapling trees.

Sycamore	57	Cherry	17
Ash	54	Holly	15
Elder	49	Snowberry	15
Hawthorn	28	Dogwood	13
Horse Chestnut	28	Prunus sp	12
Buddleia	27	Blackthorn	11
Elm	24	Holm Oak	11
Hazel	24	Norway Maple	11
Field Maple	21		

Table 4: The percentage of paths containing the most frequent tree and shrub species

The most frequent were Sycamore seedlings, partly because of the massive Sycamore harvest last year, and some paths had both adults and seedlings of the same species. Table 4 shows the commonest species in frequency order. 53 species were recorded. Horse Chestnut was frequent as a seedling, but rare as a mature tree, and Beech, Oak, Wild Privet, Blackthorn, and Elm were much less common than in the region, as were Limes and the Wayfaring Tree. Holm Oak were only present as seedlings.

Summary

All the 4400 records have been sent to the Bristol Environmental Record Centre. There are at least as many paths left to record, and those already surveyed need ideally two more surveys. The method is simple, and the opportunity for monitoring the process of change in a very special habitat is ideal.

Wildlife in Montpelier

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Introduction

I have been recording wildlife in the district of Montpelier, Bristol for several years and sharing my observations in the form of a blog called Wild Monty (<http://wildmonty.blogspot.co.uk/>). In this article I will highlight some of the more interesting wildlife I and others have recorded over the years.

Habitats

Montpelier is bounded by Cheltenham Road to the west, St Pauls to the south, St Werburghs to the east and St Andrews to the north. The area is typified by 19th century terraces, several notable Georgian properties and many modern developments of mainly flats. As a result of the high density of housing, Montpelier has few publicly accessible green spaces and wildlife habitat is therefore at a premium. Montpelier Park occupies little more than the footprint of St Andrews Church which was demolished in 1969, so it really is tiny. It consists of a children's play area, concrete basketball court, patches of amenity grassland and a few trees, mainly Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Horse Chestnut *Aesculus hippocastanum* plus a Cedar of Lebanon *Cedrus libani* and a Weymouth Pine *Pinus strobus*. Nearby, the railway cutting (a section of the Temple Meads to Severn Beach line) runs from North Road in the west to Ashley Hill in the east, providing good-quality habitat in the form of coarse grasses, scattered trees



Rosa Parks Lane, Montpelier
Nice overgrown verge

(with some well-wooded sections) and scrub. The western border of St Barnabas School playing field has a strip of urban woodland composed of Ash, Sycamore, Lime *Tilia* sp. and Rowan *Sorbus aucuparia*. Elsewhere in the neighbourhood the remaining habitat consists of a few overgrown road verges and plenty of large gardens, many of which have been allowed to grow reasonably wild, either intentionally or through neglect, attracting a selection of common garden birds. There is no standing water other than the odd garden pond.



Female Blackcap

Species

The bird list for Montpelier stands at around 64 species, although a proportion of these are observed flying over. In the 1980s Spotted Flycatchers *Muscicapa striata* bred on land to the west of Montpelier railway station and Kestrels *Falco tinnunculus* hunted nearby but much of the site has since been developed and both species have declined significantly since those far-off days. Common breeding birds in Montpelier include Blackcaps *Sylvia atricapilla*, Wrens *Troglodytes troglodytes*, Blackbirds *Turdus merula*, Tit species *Paridae*, Robins *Erithacus rubecula* and a burgeoning Goldfinch *Carduelis carduelis* population. Happily, House Sparrows *Passer domesticus* still thrive – the roof spaces of local houses provide nesting sites and there are good feeding opportunities in overgrown gardens. Chiffchaffs *Phylloscopus collybita* breed most years along the well-wooded railway cutting between Fairlawn Road and Hurlingham Road. I'm pretty sure that Great Spotted Woodpeckers *Dendrocopos major* do not breed in Montpelier, but they do occasionally visit the park. These birds may originate from nearby Narroways Nature Reserve where they are more frequently recorded.

During the spring and autumn migration it is possible to see some more unusual visitors. A Wood Warbler *Phylloscopus sibilatrix* briefly graced Montpelier Park on 25 April 2004 and the same site hosted two Pied Flycatchers *Ficedula hypoleuca* on 21 and 22 April 2008, but pride of place as regards uncommon migrants must go to a Turtle Dove *Streptopelia turtur* which was heard singing from a tree opposite the railway station on 20 April 2007. Winter can bring groups of Redwings *Turdus iliacus* and Fieldfares *Turdus pilaris* to local gardens, and on 27 December 2010 a party of twelve Waxwings *Bombus garrulus* roamed the area between Richmond Road and the station. There is quite an impressive raptor list for Montpelier given its inner-city location – Sparrowhawk *Accipiter nisus*, Peregrine *Falco peregrinus* and Buzzard *Buteo buteo* are occasionally glimpsed soaring above the rooftops, but only once so far have I been fortunate to see Red Kite *Milvus milvus*. A Hobby *Falco subbuteo* flew over Hurlingham Road on 12 May 2012. Tawny Owls *Strix aluco* have been heard hooting once or twice over the years, mainly in October when they tend to be very vocal and young birds are dispersing.

Montpelier's verges and railway cuttings possess a diversity of interesting plants. Moth Mullein *Verbascum blattaria* grows in patches near the station, as does the more expected Purple Toadflax *Linaria purpurea*, Ox-eye Daisy *Leucanthemum vulgare*, Wild Teasel *Dipsacus fullonum*, Evening Primrose *Oenothera* sp., Michaelmas Daisy *Aster* sp. and abundant Red Valerian *Centranthus ruber*.



Moth Mullein

Tuberous Comfrey *Symphytum tuberosum* grows among the vegetation on the top of a wall along Station Road, and up until recently a small patch of Brooklime *Veronica beccabunga* could be found near the Royal Mail office in the same road. The latter two species (among others) were found by Chris Rose whose valuable contribution to Wild Monty is much appreciated. Most uncut verges in the neighbourhood contain Wood Avens *Geum urbanum*, Green Alkanet *Pentaglottis sempervirens*, Hogweed *Heracleum sphondylium* and Cow Parsley *Anthriscus sylvestris*, while Ramsons *Allium ursinum*, Lady's Bedstraw *Galium verum*, Enchanter's Nightshade *Circaea lutetiana* and Cuckoo-flower *Cardamine pratensis* can be seen growing in a few front gardens. Sadly the latter species has been lost from the playing field at St Barnabas School where only a few years ago it grew in profusion. The walls in Montpelier provide good habitat for Rusty-back Fern *Asplenium ceterach*, Hart's Tongue Fern *Asplenium scolopendrium* and Wall-rue *Asplenium ruta-muraria*. Fungi appear to be few and far between, but both Jelly Ear *Auricularia auricular-judae* and Cramp Ball *Daldinia concentrica* have been noted sporadically, mainly on trees around the Fairlawn Road area, and up until recently there was an annual showing of Velvet Shank *Flammulina velutipes* in Montpelier Park.



Montpelier railway station
(the Badger sett is behind the wall on the right)

Montpelier's star mammal must be the Badger *Meles meles*. A sett has been in occupation for many years in the well-wooded bank above the disused platform at the station and animals can be seen emerging at dusk while you wait for the last train. Occasionally the Badgers venture out in broad daylight – I once saw one near the sett entrance on a Sunday lunchtime! Foxes *Vulpes vulpes* are occasionally seen in the neighbourhood either basking on railway embankments by day or trotting up

and down the road when darkness falls. Bats are a common sight on most evenings in summer, and when out and about with my bat detector I regularly encounter Pipistrelle *Pipistrellus* species and Noctules *Nyctalus noctula*. As far as other mammals are concerned, Grey Squirrels *Sciurus carolinensis* are ubiquitous especially in Montpelier Park, but amazingly I rarely see Brown Rat *Rattus norvegicus* and I have only seen Bank Vole *Myodes glareolus* once when my cat caught and killed one in the garden several years ago. Hedgehogs *Erinaceus europaeus* seem to be a rarity these days. About ten years ago at least one of these endearing creatures regularly visited a neighbour's garden but I've not seen any since. They still occur in St Werburghs so I may just be overlooking them.

Reptiles and amphibians are poorly represented apart from the occasional Slow-worm *Anguis fragilis* sighting. A dead Common Lizard *Zootoca vivipara* was found by a friend along Fairlawn Road a couple of years ago. The adjacent railway cutting no doubt provides the perfect habitat but I have never seen a live specimen away from nearby Narroways Nature Reserve which supports a good population. I have yet to see a frog or toad in Montpelier though neighbours with garden ponds occasionally report them.

In spring, Orange-tip butterflies *Anthocaris cardamines* and Brimstones *Gonepteryx rhamni* are most likely observed among the track side vegetation near the station and later in the year the same spot usually produces Meadow Brown *Maniola jurtina*, Green-veined White *Pieris napi*, Large Skipper *Ochlodes venata* and



Speckled Wood

Common Blue *Polyommatus icarus*. A colony of Ringlets *Aphantopus hyperantus* persists along the verge at Fairlawn Road. Perhaps the single most common species of butterfly in Montpelier is Speckled Wood *Pararge aegeria*. It seems to have become the iconic urban butterfly and can be seen along verges in good numbers throughout the summer. I occasionally do some moth trapping and usually get a good selection of common garden species. I have caught Small Ranunculus *Hecatera dysodea*, Old Lady *Moruo maura* and Green Silver-lines *Pseudoips prasinana* in the past. Scarlet Tiger *Callimorpha dominula* has become a common species in urban Bristol in recent years and I regularly trap them in Montpelier. Adult Cinnabar moths *Tyria jacobaeae* are seen less often than their larvae which feed on the many Common Ragwort *Senecio jacobaeae* plants on the railway cutting.



Miris striatus

The spectacular hornet mimic hoverflies *Volucella zonaria* and *V. inanis* are frequent in Montpelier but there are also good numbers of *Eristalis pertinax*, *E. tenax*, *Helophilus pendulus* and *Myathropa florea*. I have observed most of these hoverflies along the verge at Fairlawn Road where there are plenty of Hogweed umbels to attract them. The same spot is also frequented by Dark Bush-cricket *Pholidoptera griseoaptera* and the Nursery-web Spider *Pisaura mirabilis*. Single sightings of the spectacular Honeysuckle Sawfly *Zaraea fasciata* in May 2013 and the gorgeous little bug *Miris striatus* in May 2011 stick in the memory. The best beetle I've found was sadly dead – a Lesser Stag Beetle *Dorcus parallelipipedus* on the pavement in Fairfield Road. Montpelier has not escaped the recent colonisation

by Harlequin Ladybirds *Harmonia axyridis* and they are often present in large numbers, but I only occasionally see Orange Ladybird *Halyzia sedecimguttata* which sometimes turns up in the moth trap. Tree Bumblebees *Bombus hypnorum* are now well established in the neighbourhood, while Montpellier Park boasts a colony of the attractive Ashy Mining Bee *Andrena cineraria*.

Despite being one of the most built-up areas in Bristol, Montpellier supports a surprisingly diverse flora and fauna. My thanks go to all who have contributed records to Wild Monty over the years.

B-Lines – a landscape scale approach to insect pollinator conservation in the West of England

Clare Dinham (Conservation Officer, Buglife)

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Working within an identified ecological network (a B-Line), Buglife, Avon Wildlife Trust, our partners, landowners, local communities and volunteers have restored and created over 50 hectares of wildflower-rich habitats in the West of England, creating important stepping stones between our existing high value wildlife sites, helping our pollinating insects and other wildlife to move across the landscape.

Setting the scene

In living memory there has been a devastating loss of wildflower-rich grassland in the UK – over 97% of this valuable habitat has gone from our countryside. Much of our surviving wildflower-rich habitat now exists as just small fragments. As populations of insects are left isolated from each other, separated by intensively managed farmland and by our towns and cities there is a major risk of them dying out. This problem is only likely to increase as species also need to find a way to move around the country as our climate changes.

This has been one of the major contributing factors behind the dramatic declines to our native pollinators – more than two thirds of Britain's pollinators are in decline including many species of bees, butterflies, hoverflies and moths (66% of large moths are in decline, three quarters of butterfly species are in trouble and there have been significant contraction in the ranges of wild bumblebees). This is a matter of serious concern; our native wild pollinators are a key part of Britain's wildlife resource and are responsible for up to 90% of crop pollination and up to 80% of wildflower pollination. It has been calculated that one out of every three mouthfuls of the food we eat depends on pollination and the annual benefits of insect pollinators to the UK Economy have been valued at £510 million.

What are B-Lines?

B-Lines are wide strips of permanent wildflower-rich habitat. They link existing wildlife areas together creating a network of wildflower-rich habitats that weave across the British countryside. They have the potential to:

- Restore and create permanent high quality wildflower-rich grasslands (and other wildflower-rich habitats), increasing the overall area of habitat and helping conserve and enhance populations of a wide range of invertebrates.
- Reduce habitat fragmentation across our landscapes and improve habitat connectivity and species movement/dispersal across Britain.

- Contribute towards a number of ecosystem services, including pollination, carbon sequestration and water resource management.
- Reconnect people with nature, and enhance people's enjoyment of the countryside by creating new wildlife-rich areas which can enhance footpaths, cycle paths and other rights of way, and bring the countryside into towns and cities.

B-Lines at a National scale

The B-Lines Initiative aims to start addressing pollinator declines by restoring and creating large areas of wildflower-rich habitat within a prioritised and connected network. This approach will both help conserve and enhance existing insect pollinator populations, while also making it easier for these pollinators and other wildlife to move freely around the UK.

The B-Lines will over time develop into a series of linear pathways of species-rich habitat, linking existing core wildlife areas to create a coherent network. They will therefore play a core role both in increasing habitat area, increasing habitat connectivity and improving the permeability of the wider landscape. As such B-Lines can make a significant contribution towards the delivery of a natural environment more resilient to environmental change as endorsed in the Lawton review.

The aim is to target large-scale restoration and creation of wildflower-rich habitats within the B-Lines and then support this habitat with other habitat features such as species-rich hedgerows, flower-rich field margins and flowering shrubs; benefiting not only bees and other insect pollinators but a whole range of wildlife. The B-Lines Initiative is ambitious – it has calculated that to complete the network across the UK we may need 150,000 hectares of restored or newly created habitat.

Buglife, in conjunction with the Co-operative's Plan Bee Campaign, launched the B-Lines Initiative in May 2011, with a pilot project extending across the Yorkshire 'region'. The key aim of this pilot project ('Bee Roads') was to identify and map key B-Line pathways and then develop widespread partner support for a programme of delivery. The B-Lines Initiative expanded out of Yorkshire into the neighbouring counties of Durham and Tees Valley, Cumbria, Lancashire and Greater Manchester, and beyond – further mapping has since been completed in South Devon, Norfolk and Suffolk, London, Northumberland, Kent, East Sussex, West Sussex and of course here in Avon.

West of England B-Lines

The West of England B-Lines project, which began in April 2014, is a partnership between Buglife and Avon Wildlife Trust, supported by a wider partnership of numerous organisations including the unitary authorities of Bristol, South

Gloucestershire, Bath and North East Somerset and North Somerset, Natural England, Cotswolds Area of Outstanding Natural Beauty (AONB) and Mendip Hills AONB, National Trust, Bristol Regional Environmental Records Centre (BRERC) and Bristol University amongst many others. The project is benefitting from and builds on AWTs knowledge of grassland within the area, having surveyed over 2,000ha of grassland since 2008, identified 1000ha of land suitable for restoration and established good relationships with local landowners.

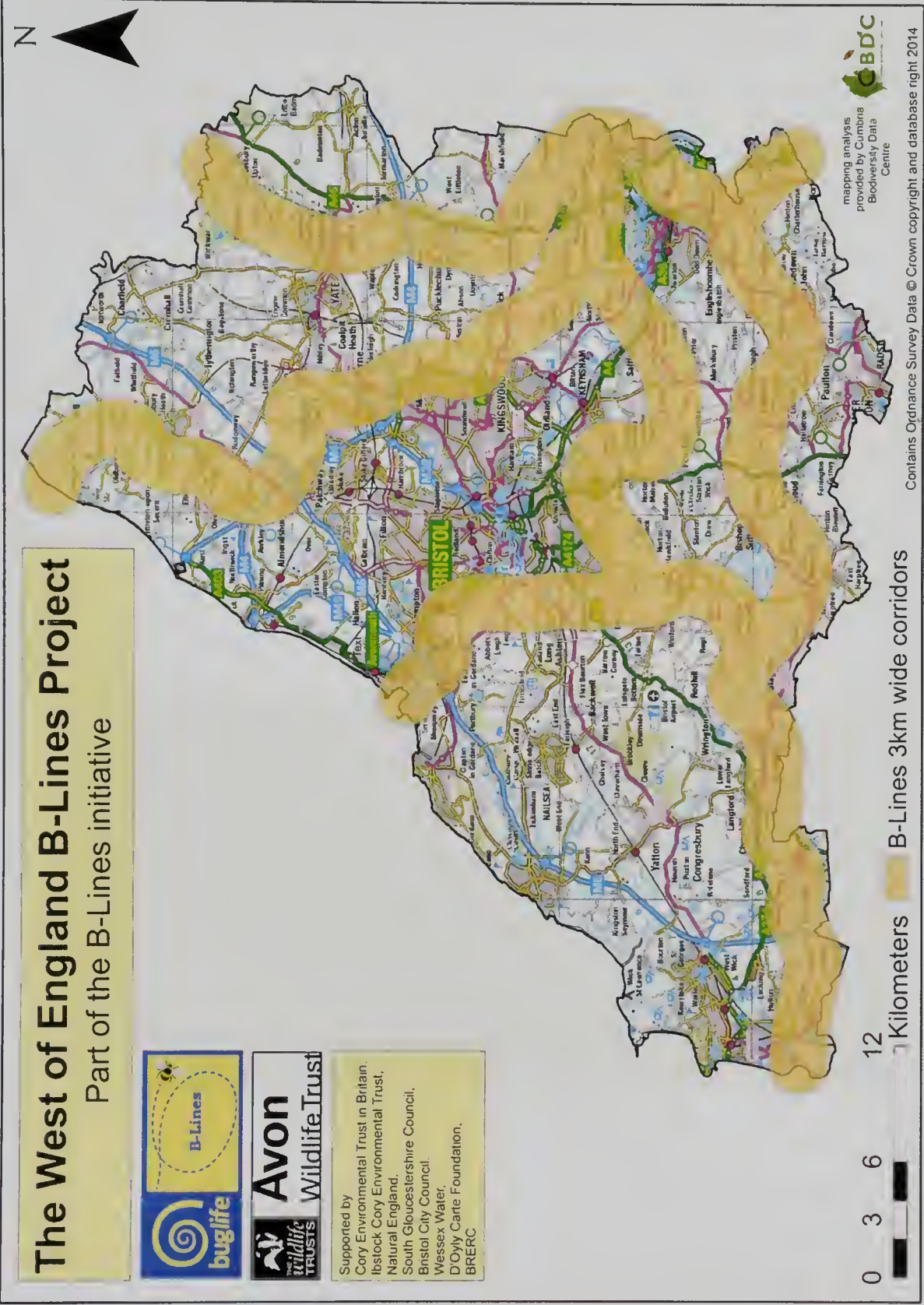
The vision for our project is ‘To create a network of B-Lines linking wildflower-rich areas across the West of England from the west to the east, and from the north to the south, linking the Cotswolds with the Mendips, cities to the countryside, and the coast to the hills.’

The first priority of the project was the production of the all important B-Lines map. The B-Lines mapping is based on both national and local habitat datasets and uses basic ‘connectivity’ modelling to identify potential pollinator dispersal pathways. Data sets including UK Biodiversity Action Plan (BAP) Priority Habitats, Local Wildlife Sites, AWT grassland survey data and relevant agri-environment uptake options were used to identify our existing areas of important habitat in the West of England. In accordance with the B-Lines ‘Guiding Principles’, the networks were mapped as 3km-wide ‘lines’, encompassing the best and majority of these areas of wildflower-rich habitats (in particular grasslands), linking them in the most ecologically sensible, yet pragmatic manner. A mapping workshop attended by key partners allowed the map to be refined and finalised, taking into account existing landscape scale and green infrastructure initiatives such as the Save Our Magnificent Meadows project being delivered in the Cotswolds AONB, and Bath and North East Somerset Council’s Place Making Plan.

Over the past 18 months Buglife and AWT have been busy engaging with land owners and land managers providing management advice, capital support where needed to cover the costs of seed, contractors or the installation of fencing for example, and practical support in the form of AWTs Grassland Restoration Team (GRT). The GRT volunteer group carries out six task days per month undertaking a range of activities to improve and create species rich grassland and provide nesting/over-wintering habitat for invertebrates such as scrub thinning and the creation of habitat piles, grassland cutting and removal of arisings, seed collection, sowing and plug planting.

Within this time over 50ha of wildflower-rich grassland has been restored or created within the B-Lines network, providing important habitat and stepping stones for our pollinating insects, invertebrates and other wildlife.

The West of England B-Lines, which covers approximately 52,500 hectares, provides a means to target habitat restoration/creation to improve ecological connectivity between our best wildlife areas. The network covers quite a substantial



West of England B-Lines map

area, and as such we have initially been focussing project delivery in a number of defined areas from the calcareous grasslands of St. Catherine's Valley to the urban fringe of south Bristol.

Nationally the B-Lines Initiative aims to play a major role in the delivery of Defra's National Pollinator Strategy (2014)¹, as well as deliver for local pollinator plans such as the Greater Bristol Pollinator Strategy². The Strategy, launched in March of this year, was developed as part of the Get Bristol Buzzing³ initiative which aims to unite organisations and individuals across the city in working together towards shared aims and actions for pollinators and their habitats.

Be part of our B-Line!

Establishing the B-Lines network is a long-term commitment which we aim to deliver via funded projects, but also through contributions from project partners, conservation organisations, landowners/managers, businesses, local communities and the general public. If you have land which you are interested in restoring to wildflower-rich grassland, or if you would like to volunteer for the project, please get in touch by contacting Clare Dinham, Conservation Officer, Buglife clare.dinham@buglife.org.uk.



Grassland Restoration Team Task Day

¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/409431/pb14221-national-pollinators-strategy.pdf

² <http://www.avonwildlifetrust.org.uk/node/3809>

³ <http://www.avonwildlifetrust.org.uk/getbristolbuzzing>

To tell us about work you are doing to provide habitat for pollinators, whether you are a school creating a bee-friendly garden, a landowner creating a wildflower meadow, a local authority developing bee-friendly flower-beds, or a business planting wildflowers in its grounds, please visit Buglife's B-Lines webpages⁴ and add your information to our B-Lines map. Numerous resources for local authorities, landowners, communities and individuals can also be found on our website. All actions, be they large or small, contribute towards the development of a cohesive B-Lines network that will allow our pollinators to move from site to site across our region.

This initial 18 month phase of the project has kindly been funded by Cory Environmental Trust in Britain (CETB), Ibstock Cory Environmental Trust (ICET), Biffa Award, SITA, Natural England, South Gloucestershire Council, Bristol City Council, Wessex Water, D'Oyly Carte Foundation and the February Foundation; and further funding has recently been awarded by ICET to carry the project into March 2016.

⁴ <https://www.buglife.org.uk/bugs-and-habitats/discover-bugs>

Recovering Species-rich Grasslands

Two case studies from Avon Wildlife Trust reserves

Rupert Higgins

Introduction

There has been considerable interest in recent years in methods of restoring species-richness in grasslands. Most schemes have involved fairly intensive methods such as turf translocation, seeding with one of the many commercially available wildflower seed mixes and spreading with green hay. Some of these schemes have been well designed but many have overlooked the fundamental issue, which is soil fertility. Species-rich grasslands require soils that are low in nutrients, especially phosphates and nitrates, and any scheme that ignores this is doomed to failure. As is often the case with habitat restoration schemes there has been little enthusiasm for monitoring, and where works are followed by surveys these often take place over the short term only, governed by the availability of funding. This often has the result that schemes appear more successful than they are, since monitoring only covers the establishment phase when, for example, seed mixes may show initial success before the problem of high levels of soil fertility asserts itself and coarse grasses regain dominance.

This article looks over a longer term than usual at the fortunes of areas of species-poor grassland on two Avon Wildlife Trust nature reserves. It is unusual for reserves to include substantial areas of species-poor grassland but the practicalities of the acquisition of Folly Farm and Dolebury Warren in the 1980s meant that the more desirable habitats could not be acquired without also taking on land that would not normally be included in nature reserves. The policy towards these areas has been to allow gradual diversification rather than aiming for rapid gains, allowing soil fertility to slowly decline whilst grazing the fields. There are several reasons for the adoption of this *laissez-faire* approach. Primarily, financial resources are necessarily limited and those available have properly been targeted on the management and enhancement of the most valuable areas. Secondly, the availability of less valuable grasslands is of benefit in site management. It allows stock to graze on the site at seasons when they are kept off the more sensitive areas, and it may make grazing the reserve more attractive to farmers.

I have been fortunate enough to have surveyed these grasslands at intervals over the decades since the 1980s, and whilst the survey methods have varied slightly and are sub-optimal they do reveal some marked changes in grassland composition. It is best practice to have a hypothesis at the outset of any study. To apply the word hypothesis to my thoughts in the 1980s is rather presumptuous but success would have been defined by the degree to which the recovering grasslands came to resemble the unimproved grasslands on each site; unimproved grassland are those that have escaped treatment with fertilisers or herbicides, or re-seeding, and

therefore are species-rich. I would have expected the progress of the various grasslands to be determined by two main factors. Firstly, the nature of the previous management: a short period of ploughing and arable management may affect soil fertility and therefore grassland composition less than years of applications of fertilisers to grassland. Secondly, the nature of the soils: thin, freely draining soils might be expected to lose excess fertility relatively quickly as rain leaches nutrients away freely whilst more clay-rich soils retain fertility for longer. This is partly because water passes through a clay soil more slowly, and also because nutrients bond to the clay particles but remain available to plants.

Methods

The data used below have been gathered in simple walkover surveys: a plant species list for each field or other area of grassland has been drawn up and an abundance code has been assigned to each species using the DAFOR scale, where the following abbreviations are used: D – dominant; A – abundant; F – frequent; O – occasional; R – rare; plus L – locally and V – very.

These lists are presented in the appendix below.

Analysis of the lists can most simply be made by counting the total of species recorded during each visit, but this is a very imperfect method. It does not account for the different ecological status of different species. In particular the abundance as well as the presence of species characteristic of unimproved grassland is an important indicator of success, whilst any abundance of species particularly associated with either intensively managed or heavily disturbed grasslands would indicate poor progress towards unimproved grassland. The discussion below focuses on these two measures: a positive change being indicated by an increase in indicator species of unimproved grassland and a decline in species associated with intensively managed or heavily disturbed grassland.

Results

Folly Farm

The major unimproved grassland type at Folly Farm is on clay-rich neutral soils, with a characteristic flora including Black Knapweed (*Centaurea nigra*), Betony (*Stachys officinalis*), Devil's-bit Scabious (*Succisa pratensis*) and Dyer's Greenweed (*Genista tinctoria*). In National Vegetation Classification (NVC) terms these grassland are outstanding examples of MG5 Crested Dogtail–Black Knapweed grasslands, with the localised presence of species indicative of either calcareous grassland or acidic grassland being an unusual feature. Examples of the former include Upright Brome (*Bromopsis erecta*) and Stemless Thistle (*Cirsium acaule*) and of the latter Heath Milkwort (*Polygala serpyllifolia*) and Heath Spotted Orchid

(*Dactylorhiza maculata*). These grasslands are designated a Site of Special Scientific Interest (SSSI).

When the Trust purchased Folly Farm in 1986, with the primary aim of protecting these unimproved grasslands along with an area of ancient woodland, the property also included species-poor grasslands in two main blocks. The lower block, close to the farm and below the slope supporting unimproved grassland, had been intensively farmed in a conventional manner, largely as improved pasture with some arable crops grown on a rotation. The grasslands here had all been reseeded at least once and regular fertiliser applications had been made. The upper block, on the plateau above the unimproved grassland, had not been reseeded but had received applications of fertiliser. For some years before the purchase they had been used to graze a large number of horses, mostly rescued for welfare reasons.

I surveyed the site, with Antony Merritt, in 1985 before the decision to purchase was made. We concentrated on the diverse fields: at the time the lower fields were overwhelmingly dominated by Perennial Rye-grass (*Lolium perenne*) and the upper fields had abundant growths of species tolerant of disturbed and compacted soils, including Seentless Mayweed (*Tripleurospermum inodorum*) and Shepherd's Purse (*Capsella bursa-pastoris*).

I next surveyed the species-poor grasslands in 1992 in order to assess their suitability for tree planting, which was carried out over some areas, and resurveyed them in 2000 as part of an overall assessment of the reserve's vegetation. A small sample of fields, one in the lower area and two in the upper, was then surveyed in 2015.

Lower Cabin, the field included in the 2015 survey, was typical of the lower fields. In 1992 it was species-poor and dominated by Perennial Rye-grass and White Clover (*Trifolium repens*). There were some remnants of previous arable management, notably Corn Mint (*Mentha arvensis*), but indicator species of unimproved grassland were entirely absent. By 2000 it was considerably more diverse, having increased from 11 to 30 species. It was noticeable that the grass component of the sward had changed significantly, although Perennial Rye-grass remained frequent. Species that had appeared included Sweet Vernal Grass (*Anthoxanthum odoratum*) and Red Fescue (*Festuca rubra*) and the frequency of Crested Dogstail had risen substantially. Many herb species had appeared but no indicator species of unimproved grassland were recorded. The presence of Changing Forget-me-not (*Myosotis discolor*) was notable, and other species that had appeared included Common Mouse-ear (*Cerastium fontanum*) and Meadow Buttercup (*Ranunculus acris*). There was a much less marked increase in diversity – 30 species to 34 species – between 2000 and 2015 but the disappearance of several species over that period masks the fact that 11 species were recorded for the first time in 2015. These include the first indicator species of unimproved grassland recorded in the field: Common Bird's-foot Trefoil (*Lotus corniculatus*) and Lesser Stitchwort (*Stellaria graminea*). Equally significant were

changes in the abundance of several species: Perennial Rye-grass and White Clover were less frequent whilst Common Bent, Yorkshire Fog (*Holcus lanatus*), Meadow Barley (*Hordeum secalinum*), Yarrow (*Achillea millefolium*) and Cut-leaved Cranesbill (*Geranium dissectum*) were more frequent.

Two of the upper fields were surveyed in all three years. In 1992 Plain Hill and Great Wall Close supported 22 and 20 species respectively. The most frequent of these were Creeping Bent (*Agrostis stolonifera*), Yorkshire Fog, Creeping Thistle (*Cirsium arvense*), Black Medick (*Medicago lupulina*) and Self-heal (*Prunella vulgaris*). Indicator species of unimproved grassland were not entirely absent, with small quantities of several species including Agrimony (*Agrimonia eupatoria*), Purging Flax (*Linum catharticum*) and Sneezewort (*Achillea ptarmica*) in Plain Hill and Meadow Vetchling (*Lathyrus pratensis*), Common Bird's-foot Trefoil and Burnet Saxifrage (*Pinpinella saxifraga*) in Great Wall Close.

In 2000 the diversity of species had risen to 48 in Plain Hill and 47 in Great Wall Close and there had been striking increases in the frequency of Crested Dogstail, Red Fescue, Perennial Rye-grass, Glaucous Sedge and Sweet Vernal Grass. Species that had become less frequent include Common Ragwort (*Senecio jacobaea*), Self-heal, Black Medick and Spear Thistle (*Cirsium vulgare*). The diversity of indicator species of unimproved grassland had risen from six to 15 in Plain Hill and from six to 11 in Great Wall Close. Not all changes were positive: Purging Flax was apparently lost from Plain Hill and Sneezewort, Burnet Saxifrage and Tufted Vetch from Great Wall Close. A few indicator species, notably Glaucous Sedge and Common Bird's-foot Trefoil were fairly frequent but most were present in small quantity only.

By 2015 there had been a dramatic change in the appearance of the two fields, which presented a fine spectacle of a yellow carpet of Common Bird's-foot Trefoil, Lady's Bedstraw and Yellow Rattle (*Rhinanthus minor*) punctuated by spikes of Black Knapweed and localised drifts of Ox-eye Daisy. The total species counts of the two fields were 53 in Plain Hill and 64 in Great Wall Close, and the totals of indicator species in the two fields had risen to 19 and 25 respectively. The species that had apparently disappeared between 1992 and 2000 were all re-found and notable additions to the species lists included Common Spotted Orchid (*Dactylorhiza fuchsii*), Dyer's Greenweed (*Genista tinctoria*), Corky-fruited Water Dropwort (*Oenanthe piupinelloides*), Tormantil (*Potentilla erecta*), Yellow Rattle and Pepper Saxifrage (*Silene silaus*). Perhaps more striking were the changes in abundance: species that had become markedly more frequent include Common Bent (*Agrostis capillaris*), Sweet Vernal Grass (*Anthoxanthum odoratum*), Red Fescue, Black Knapweed, Lady's Bedstraw, Meadow Vetchling, Ox-eye Daisy and Common Bird's-foot Trefoil.

One interesting change between 2000 and 2015 was the decline in species associated with wetlands: Creeping Foxtail (*Alopecurus geniculatus*), Oval Sedge

(*Carex ovalis*), Jointed Rush (*Juncus articulatus*), Toad Rush (*Juncus bufonius*) disappeared altogether and the frequencies of Marsh Thistle (*Cirsium palustre*), Clustered Rush (*Juncus conglomeratus*) and Hard Rush (*Juncus inflexus*) all declined.

Dolebury Warren

Dolebury Warren is primarily of importance for its unimproved limestone grasslands, with species-rich examples of several characteristic Mendip vegetation types. Much of the area has Upright Brome-dominated grassland (NVC type CG3). Where grazing pressure has been consistently higher the grassland is shorter and there are areas of Sheep's Fescue-Field Oatgrass grassland (NVC type CG2). Steeper slopes support sparser grassland dominated by Sheep's Fescue (NVC type CG1). A particular feature is the presence of substantial areas of limestone heath, where the presence of wind-blown soils from the post glacial period has allowed lime-loving (calcicole) and lime-hating (calcifuge) plants to grow together in an unusual combination.

Three previously improved areas of grassland have been surveyed for the purposes of this article. Two, referred to as R1 and R3, are on the northern flank of the hill. At the beginning of the 1980s, when Dolebury became a reserve, R1 was used to grow kale and R3 had improved grassland. Their lack of botanical diversity meant that they were not covered by the Mendip Survey in 1977 or by early Avon Wildlife Trust surveys. On the vegetation maps that Antony Merrit produced in 1984 they were marked simply as improved grassland. The first description covering their vegetation in any detail was made in 1989: "*The species composition of the improved fields was markedly different to other areas. Very few of the characteristic calcareous or calcifuges species were recorded. Instead, four typical species of sown pasture were common: Rye Grass, Bromus mollis [now Bromus hordaceus] and Red and White Clover. Also present were: Ribwort Plantain, Cat's Ear, Dandelion, Yarrow, Field Mouse-ear and Creeping Thistle. Several moss species were also prominent.*"

The first systematic survey of these fields was made by the author in 2000. At that time the most frequent grasses were Common Bent, Red Fescue and Yorkshire Fog. No herb species were present in large quantity, but the more frequent species included Ribwort Plantain (*Plantago lanceolata*), Self-heal and White Clover. The overall species totals for the two fields were 37 and 36 respectively. The totals of indicator species of unimproved grasslands were nine and 15 respectively. Most of the indicator species were present in small quantity but there were good quantities of Glaucous Sedge and Eyebright (*Enphrasia spp*). Other plants of unimproved grassland that had colonised included calcifuges such as Heath Grass (*Danthonia decumbens*), Creeping St John's Wort (*Hypericum humifusum*) and Bell Heather (*Erica cinerea*), suggesting that limestone heath was regenerating in parts of the fields. In 2015 the total of species had risen to 53 and 54 respectively and of

indicator species to 25 and 24. The most frequent grasses were Common Bent, Sweet Vernal grass, Crested Dogtail and Yorkshire Fog and herbs present in good quantity included Glaucous Sedge, Purging Flax, Common Bird's-foot Trefoil and Tormentil. In addition to the calcifuge species listed above, Ling (*Calluna vulgaris*), Upright St John's Wort (*Hypericum pulchrum*) and Heath Speedwell (*Veronica officinalis*) were present, together with calcicoles such as Upright Brome, Stemless Thistle and Salad Burnet (*Sanguisorba minor*). Some of the indicator species, notably Meadow Vetchling, were locally very frequent. Mosses continued to be prominent components of the sward, with particularly large quantities of *Rhytidiadelphus squarrosus* and *Pseudoscleropodium purum*.

There is slightly more information relating to the third field, R6, on the southern side of the hill: in 1992 Dawn Lawrence and the author surveyed it in order to inform a proposal to harrow the field in order to speed the establishment of unimproved grassland. The harrowing was not carried out due to concerns over damage to archaeological features. This survey found the most frequent grasses to be Common Bent, Soft Brome (*Bromus hordaceus*), Crested Dogtail, Yorkshire Fog and Perennial Rye-grass. Herbs were generally scarce, with species in reasonable quantity including Yarrow (*Achillea millefolium*), Ribwort Plantain, Dandelion and White Clover. The total of species recorded was 34, of which only three were indicator species of unimproved grassland. The composition of the sward had changed significantly by 2000. The most frequent grass species were now Common Bent, Sweet Vernal Grass, Crested Dogtail, Red Fescue and Yorkshire Fog, and the more frequent herbs included Common Mouse-ear (*Cerastium fontanum*), Spear Thistle, Smooth Hawksbeard (*Crepis capillaris*), Lady's Bedstraw, Purging Flax and Self-heal. The total of plant species recorded had risen to 55, of which 22 were indicators of unimproved grassland, these latter including Yellow-wort (*Blackstonia perfoliata*) and Thyme (*Thymus polytrichus*). Between 2000 and 2015 the change in the sward was less striking, although Upright Brome was by now present in reasonable quantity and there was a significant decrease in the frequency of Yorkshire Fog. Amongst the herbs, Lady's Bedstraw, Ground-ivy (*Glechoma hederacea*), Purging Flax, Common Bird's-foot Trefoil and Ribwort Plantain had become significantly more frequent, and species such as Eyebright, Harebell (*Campanula rotundifolia*) and the hybrid between Tormentil and Creeping Cinquefoil (*Potentilla x mixta*) were now locally frequent. The total of species recorded was 64, of which 32 are indicators of unimproved grassland.

Discussion

It is clear from the accounts above, and the tables below, that grassland recovery has progressed well at the two sites. A rough measure of the success of grassland recovery at the two sites can be given by comparing the species totals recorded in nearby areas of unimproved grassland during the 2000 surveys, as shown in the following tables:

Folly Farm

	Total number of plant species	Number of plant species as a percentage of total in North Hill	Number of indicator species of unimproved grassland	Number of indicator species of unimproved grassland as a percentage of number in North Hill
Unimproved grassland (North Hill)	106		39	
Lower Cabin 1992	11	10%	0	0
Lower Cabin 2000	30	28%	0	0
Lower Cabin 2015	34	32%	2	5%
Plain Hill 1992	22	21%	6	15%
Plain Hill 2000	48	45%	15	38%
Plain Hill 2015	53	50%	19	49%
Great Wall Close 1992	20	19%	6	15%
Great Wall Close 2000	47	44%	11	28%
Great Wall Close 2015	64	60%	25	64%

Dolebury Warren

	Total number of plant species	Number of plant species as a percentage of total in U3	Number of indicator species of unimproved grassland	Number of indicator species of unimproved grassland as a percentage of number in U3
Unimproved grassland (U3)	70		34	
R1 2000	37	53%	9	26%
R1 2015	53	76%	25	74%
R3 2000	36	51%	15	44%
R3 2015	54	77%	24	71%
R6 1992	34	49%	3	9%
R6 2000	55	79%	22	65%
R6 2015	64	91%	32	94%

It should be stressed that the totals and percentages above are based on presence and absence only and do not take into account differences in species abundance between the areas. They do not imply that R6, for instance, now has 94% of the ecological value of the adjacent area of unimproved grassland where several notable species that are present in the recovering grasslands in small quantity only are frequent. It is worth listing some of the species that have as yet failed to colonise the recovering grasslands at the two sites. At Folly Farm these include Betony, Devil's-bit Scabious and Burnet Saxifrage (*Pimpinella saxifraga*) and at Dolebury Warren Common Rockrose (*Helianthemum nummularium*), Autumn Gentian (*Gentianella amarella*), Small Scabious (*Scabiosa columbaria*) and Kidney Vetch (*Anthyllis vulneraria*). It would be interesting to carry out soil tests to determine whether these absences are due to residual elevated soil fertility or to slow rates of colonisation.

The only significant colonisation and subsequent disappearance of a group of species has involved the group of wetland species in the upper fields at Folly Farm. It might be that compaction of the soils here impeded drainage and allowed development of small patches of wetland vegetation, but that as the soil has recovered these conditions are no longer present.

The figures in the table above suggest that grassland recovery has been more successful at Dolebury Warren than at Folly Farm, and has been particularly slow in Upper Cabin. This confirms the suggestion made in the Introduction that recovery will be quicker on well-drained soils that have a low clay content than on clay-rich soils, as found at Folly Farm. The particularly slow recovery at Lower Cabin may be due to a combination of the heavier soils here and a longer history of intensive agricultural management.

I would conclude that these results vindicate the decisions that were made to allow recovery of these fields to progress slowly, without specialist intervention. Often measures such as wild flower seeding aim to produce rapid results, but surely as ecologists and nature conservationists we should be prepared to take a longer view and be more satisfied with slow but long-lasting gains rather than quick changes that might not persist in the long term. There are disadvantages to the short term approach, in addition to those outlined in the Introduction. In particular, the use of wild flower seeds entails the risk of introducing non-native strains of plants, which occur even in reputable mixes. On a more fundamental note, one of the criteria by which the ecological value of sites is judged is naturalness, and grasslands that have been allowed to recover with minimal intervention are more natural than those where the process has been accelerated.

The swards that have developed here are not yet the equal of those that would have existed on the fields before they were improved and this emphasises the importance of protecting and managing ancient habitats before embarking on attempts to restore damaged areas. However, the ability of species such as Dyer's Greenweed and Sneezewort to recolonise previously improved fields at Folly Farm, and of elements

of limestone grassland to do the same at Dolebury Warren, is heartening and represents a clear increase in the nature conservation value of these nature reserves.

These surveys covered vegetation only, but it is likely that similar gains would be seen if insect surveys were carried out. Casual observations suggest that this is the case: species observed in the recovering grasslands include Marbled White butterfly (*Melanargia galathea*) and both Six-spot and Narrow-bordered Five-spot Burnet moths (*Zygaena filipendulae* and *Zygaena lonicerae*) at Folly Farm and Small Heath butterfly (*Coenonympha pamphilus*), *Pyrauster deysicalis* moth and Glow-worm (*Lampyrus noctiluca*) at Dolebury. One absence is significant: no ant hills of Yellow Meadow Ant (*Lasius flavus*) were seen in the recovering grasslands at Folly Farm although they are frequent in the unimproved grasslands where they are favoured by plants such as Large Thyme (*Thymus pulegioides*). Ant hills are, however, frequent in the recovering grasslands at Dolebury; it might be that excessive soil compaction at Folly Farm has made the soils here too dense for the ants.

Appendices: Plant Species Lists

The species lists below include abundance assessments using the following abbreviations: D – dominant; A – abundant; F – frequent; O – occasional; R – rare; L – locally; V –very.

Species given in italics are considered to be grassland indicator species.

Folly Farm: Lower Area

Folly Farm: Lower Area		Lower Cabin		
		1992	2000	2015
<i>Agrostis capillaris</i>	Common Bent			OLA
<i>Agrostis stolonifera</i>	Creeping Bent	O	F	R
<i>Alopecurus geniculatus</i>	Creeping Foxtail		R	
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass		O	O
<i>Arrhenatherum elatius</i>	False Oat-grass			R
<i>Bromus hordaceus</i>	Soft Brome		RO	R
<i>Cynosurus cristatus</i>	Crested Dogstail	O	OF	OF
<i>Dactylis glomerata</i>	Cocksfoot			R
<i>Festuca rubra</i>	Red Fescue		R	O
<i>Holcus lanatus</i>	Yorkshire Fog	R	O	OLF
<i>Hordeum secalinum</i>	Meadow Barley			RLF
<i>Lolium perenne</i>	Perennial Rye-grass	F	F	RLF
<i>Phleum pratense</i>	Timothy	O		R
<i>Poa annua</i>	Annual Meadow-grass		R	

Folly Farm: Lower Area		Lower Cabin		
		1992	2000	2015
Poa pratensis	Smooth Meadow-grass			R
Poa trivialis	Rough-stalked Meadow-grass		OF	R
Achillea millefolium	Yarrow			O
Bellis perennis	Common Daisy		R	
Cerastium fontanum	Common Mouse-ear		O	R
Cerastium glomeratum	Clustered Mouse-ear		R	
Cirsium arvense	Creeping Thistle		O	R
Cirsium palustre	Marsh Thistle		R	R
Cirsium vulgare	Spear Thistle		R	R
Geranium dissectum	Cut-leaved Cranesbill			O
Juncus bufonius	Toad Rush		VR	
Juncus effusus	Soft Rush	R		R
<i>Lotus corniculatus</i>	<i>Common Bird's-foot Trefoil</i>			RLF
Medicago lupulina	Black Medick	O		R
Mentha arvensis	Field Mint	R		
Myosotis arvensis	Common Forget-me-not			R
Myosotis discolour	Changing Forget-me-not		RO	
Plantago lanceolata	Ribwort Plantain		VR	
Plantago major	Ratstail Plantain		VR	
Potentilla anserina	Silverweed			RLF
Prunella vulgaris	Self-heal	R	RO	
Ranunculus acris	Meadow Buttercup		R	R
Ranunculus bulbosus	Bulbous Buttercup		R	R
Ranunculus repens	Creeping Buttercup		F	O
Rumex acetosa	Common Sorrel			R
Rumex crispus	Curled Dock		R	R
Sagina procumbens	Procumbent Pearlwort		R	
Senecio jacobaea	Common Ragwort	R		
Stellaria graminea	Lesser Stitchwort			R
Trifolium dubium	Lesser Trefoil		RO	
Trifolium pratense	Red Clover		R	R
Trifolium repens	White Clover	F	F	O
Urtica dioica	Stinging Nettle		R	R

Folly Farm: Upper Area

Folly Farm: Upper Area		Plain Hill			Great Wall Close		
		1992	2000	2015	1992	2000	2015
Agrostis capillaris	Common Bent			OLA	O		F
Agrostis stolonifera	Creeping Bent	F	F	O	F	O	R
Alopecurus geniculatus	Creeping Foxtail		R			R	
Anthoxanthum odoratum	Sweet Vernal Grass	O	RO	O		O	OLF
Arrhenatherum elatius	False Oat-grass					R	R
Brachypodium sylvaticum	Wood False-brome		VR				
Briza media	Quaking Grass		R	R			
Bromus commutatus	Meadow Brome			R			R
Bromus hordaceus	Soft Brome			R			R
Cynosurus cristatus	Crested Dogstail	O	F	OLF		A	F
Dactylis glomerata	Cocksfoot		R	R		VLF	R
Deschampsia cespitosa	Tufted Hair-grass			R			R
Festuca rubra	Red Fescue		RO	OLF		O	OLF
Helictotrichon pratense	Field Oat-grass		R				
Helictotrichon pubescens	Downy Oat-grass						R
Holcus lanatus	Yorkshire Fog	O	R	F	F	RLF	F
Lolium perenne	Perennial Rye-grass	O	F	R		A	R
Phleum pratense	Timothy	O		R		R	R
Poa humilis	Spreading Meadow-grass		R	R		R	R
Poa pratensis	Smooth Meadow-grass			R			R
Poa trivialis	Rough-stalked Meadow-grass		RO			RO	R
Trisetum flavescens	Golden Oat-grass		R	R		R	R
Achillea ptarmica	Sneezewort				R		RLF
Agrimonia eupatoria	Agrimony	O	R	O	R	R	R
Bellis perennis	Common Daisy	O	RO			RO	R
Carex flacca	Glaucous Sedge	R	OF	O		O	RLF
Carex ovalis	Oval Sedge		R			RLF	

Folly Farm: Upper Area		Plain Hill			Great Wall Close		
		1992	2000	2015	1992	2000	2015
<i>Centaurea nigra</i>	<i>Black Knapweed</i>		R	OLF		R	OLF
<i>Cerastium fontanum</i>	<i>Common Mouse-ear</i>		R	R		R	O
<i>Cirsium acaule</i>	<i>Stemless Thistle</i>		R	R			
<i>Cirsium arvense</i>	<i>Creeping Thistle</i>	F	O	R	O	R	R
<i>Cirsium palustre</i>	<i>Marsh Thistle</i>		R			R	R
<i>Cirsium vulgare</i>	<i>Spear Thistle</i>	O					
<i>Convolvulus arvensis</i>	<i>Field Bindweed</i>		R	R			
<i>Crepis vesicaria</i>	<i>Beaked Hawksbeard</i>			R			R
<i>Dactylorhiza fuchsii</i>	<i>Common Spotted Orchid</i>						R
<i>Equisetum arvense</i>	<i>Field Horsetail</i>					R	R
<i>Galium verum</i>	<i>Lady's Bedstraw</i>	R	R	OLF			F
<i>Genista tinctoria</i>	<i>Dyer's Greenweed</i>			R			R
<i>Geranium dissectum</i>	<i>Cut-leaved Cranesbill</i>		R				
<i>Heracleum sphondylium</i>	<i>Hogweed</i>						R
<i>Hypericum perforatum</i>	<i>Perforate St John's Wort</i>				R		
<i>Hypochaeris radicata</i>	<i>Common Catsear</i>	O	R	R		R	R
<i>Juncus articulatus</i>	<i>Jointed Rush</i>					R	
<i>Juncus bufonius</i>	<i>Toad Rush</i>					R	
<i>Juncus conglomeratus</i>	<i>Clustered Rush</i>					VLF	R
<i>Juncus effusus</i>	<i>Soft Rush</i>				R		R
<i>Juncus inflexus</i>	<i>Hard Rush</i>					VLF	R
<i>Lathyrus pratensis</i>	<i>Meadow Vetchling</i>		R	RLF	R	R	R
<i>Leontodon hispidus</i>	<i>Rough Hawkbit</i>			R			R
<i>Leontodon taraxacoides</i>	<i>Lesser Hawkbit</i>		R	R	R	R	O
<i>Leucanthemum vulgare</i>	<i>Ox-eye Daisy</i>	R	VR	RLF			RLF
<i>Linum catharticum</i>	<i>Purging Flax</i>	R					RLF
<i>Lotus corniculatus</i>	<i>Common Bird's-foot Trefoil</i>	R	RO	OLF	R	RO	F
<i>Lotus pedunculatus</i>	<i>Greater Bird's-foot Trefoil</i>					RLF	
<i>Medicago lupulina</i>	<i>Black Medick</i>	F					

Folly Farm: Upper Area		Plain Hill			Great Wall Close		
		1992	2000	2015	1992	2000	2015
<i>Myosotis discolor</i>	Changing Forget-me-not					R	
<i>Oenanthe pimpinelloides</i>	Corky-fruited Water Dropwort			O			R
<i>Plantago lanceolata</i>	Ribwort Plantain		RO	R		R	F
<i>Plantago media</i>	Hoary plantain		R	R			
<i>Potentilla erecta</i>	Tormentil						R
<i>Potentilla reptans</i>	Creeping Cinquefoil		R	R		R	
<i>Pulicaria dysenterica</i>	Common Fleabane						R
<i>Primula veris</i>	Cowslip						R
<i>Prunella vulgaris</i>	Self-heal	F	RO	R	R	O	O
<i>Ranunculus acris</i>	Meadow Buttercup		O	O		O	O
<i>Ranunculus bulbosus</i>	Bulbous Buttercup		R	O			R
<i>Ranunculus repens</i>	Creeping Buttercup		O	O	O	O	R
<i>Rhinanthus minor</i>	Yellow Rattle			RLF			OLF
<i>Rumex acetosa</i>	Common Sorrel			R			
<i>Rumex crispus</i>	Curled Dock		R	R	O	R	
<i>Sagina procumbens</i>	Procumbent Pearlwort		R			R	
<i>Scorzoneroide autumnalis</i>	Autumnal Hawkbit		R	R	R		R
<i>Senecio erucifolius</i>	Hoary Ragwort					R	R
<i>Senecio jacobaea</i>	Common Ragwort	O	VR	R			R
<i>Silaum silaus</i>	Pepper Saxifrage						RLF
<i>Stellaria graminea</i>	Lesser Stitchwort			R			R
<i>Taraxacum vulgare</i> agg.	Dandelion		R	R		R	
<i>Tragopogon pratense</i>	Goatsbeard			R	R		R
<i>Trifolium dubium</i>	Lesser Trefoil		R	R		R	R
<i>Trifolium medium</i>	Zigzag Clover		R	R			R
<i>Trifolium pratense</i>	Red Clover	O	R	OLF	O	RO	O
<i>Trifolium repens</i>	White Clover	O	O	R	O	O	R
<i>Urtica dioica</i>	Stinging Nettle					VR	
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell		R			R	
<i>Vicia cracca</i>	Tufted Vetch				R		RLF

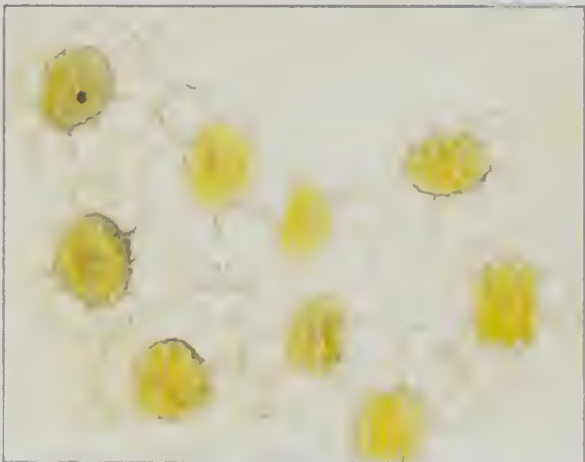
Dolebury Warren

Dolebury Warren		R1		R3		R6		
		2000	2015	2000	2015	1992	2000	2015
<i>Agrostis capillaris</i>	Common Bent	OLF	F	OF	F	OLF	OF	O
<i>Agrostis stolonifera</i>	Creeping Bent						R	R
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass		O	F	O		F	O
<i>Arrhenatherum elatius</i>	False Oat-grass		R					R
<i>Brachypodium sylvaticum</i>	Wood False-brome				R			R
<i>Briza media</i>	<i>Quaking Grass</i>						R	R
<i>Bromopsis erecta</i>	<i>Upright Brome</i>		R		R			O
<i>Bromus hordaceus</i>	Soft Brome					F	R	R
<i>Cynosurus cristatus</i>	Crested Dogstail	O	O	O	O	OLF	F	R
<i>Dactylis glomerata</i>	Cocksfoot	R			R	O	R	R
<i>Danthonia decumbens</i>	<i>Heath Grass</i>		R	RO	R			
<i>Deschampsia cespitosa</i>	Tufted Hair-grass				R			
<i>Festuca rubra</i>	Red Fescue	OF	OLF	F	OLF	RLF	F	OLF
<i>Festuca pratensis</i>	Meadow Fescue							R
<i>Helictotrichon pratense</i>	<i>Field Oat-grass</i>		R		R			R
<i>Helictotrichon pubescens</i>	<i>Downy Oat-grass</i>				R		R	R
<i>Holcus lanatus</i>	Yorkshire Fog	F	OLF	F	O	OLF	A	O
<i>Koeleria macrantha</i>	<i>Crested Hair-grass</i>							R
<i>Lolium perenne</i>	Perennial Rye-grass	O	R		R	F	R	R
<i>Phleum bertolonii</i>	<i>Small Catstail</i>							R
<i>Phleum pratense</i>	Timothy							
<i>Poa trivialis</i>	Rough-stalked Meadow Grass	R					R	
<i>Trisetum flavescens</i>	<i>Golden Oat-grass</i>						R	O
<i>Achillea millefolium</i>	Yarrow					O	RO	O
<i>Agrimonia eupatoria</i>	<i>Agrimony</i>		R		R			R
<i>Bellis perennis</i>	Common Daisy	R		R		R	R	

Dolebury Warren		R1		R3		R6		
		2000	2015	2000	2015	1992	2000	2015
<i>Blackstonia perfoliata</i>	Yellow Wort						VR	VR
<i>Calluna vulgaris</i>	Ling		RLF		RLF			
<i>Campanula rotundifolia</i>	Harebell				R			RLF
<i>Cardamine hirsuta</i>	Hairy Bittercress					R		
<i>Carduus nutans</i>	Nodding Thistle						R	R
<i>Carex caryophylla</i>	Spring Sedge							R
<i>Carex flacca</i>	Glaucous Sedge	R	O	O	O		R	RLF
<i>Centaurea erythraea</i>	Centaury	RLF	R	R			RO	R
<i>Cerastium fontanum</i>	Common Mouse-ear	O	R	RO	R	R	O	
<i>Cerastium glomeratum</i>	Clustered Mouse-ear						R	
<i>Cirsium acaule</i>	Stemless Thistle				R		R	R
<i>Cirsium arvense</i>	Creeping Thistle	O	R	O	R	RLF	RLF	R
<i>Cirsium palustre</i>	Marsh Thistle	OF	R	O	R		R	R
<i>Cirsium vulgare</i>	Spear Thistle	R	R		R	R	O	R
<i>Crepis capillaris</i>	Smooth Hawksbeard	O	O	O	R		O	O
<i>Crepis vesicaria</i>	Beaked Hawksbeard				R	R		
<i>Dactylorhiza fuchsii</i>	Common Spotted Orchid		R		RLF			
<i>Erica cinerea</i>	Bell Heather			R	R			VR
<i>Euphrasia nemorosa</i>	Eyebright	RLF	O	OLF	O		R	O
<i>Euphrasia tetraquetra</i>	Eyebright				R		R	O
<i>Fragaria vesca</i>	Wild Strawberry		R		R			R
<i>Galium verum</i>	Lady's Bedstraw		R		O		O	OLF
<i>Geranium dissectum</i>	Cut-leaved Cranesbill					R	R	R
<i>Glechoma hederacea</i>	Ground-ivy	R				R	R	OLF
<i>Hypericum humifusum</i>	Creeping St John's Wort	R	R	R				
<i>Hypericum perforatum</i>	Perforate St John's Wort					R		
<i>Hypericum pulchrum</i>	Upright St John's Wort			R				R

Dolebury Warren		R1		R3		R6		
		2000	2015	2000	2015	1992	2000	2015
<i>Hypochaeris radicata</i>	Common Catsear			R		R	RO	RLF
<i>Juncus tenuis</i>	Slender Rush		R		R			
<i>Lathyrus pratensis</i>	Meadow Vetchling		RLA		RLF		R	RLF
<i>Leontodon taraxacoides</i>	Lesser Hawkbit	RO		RO	R	R	O	R
<i>Leontodon hispidus</i>	Rough Hawkbit		O		R			O
<i>Leucanthemum vulgare</i>	Ox-eye Daisy		R				VR	
<i>Linum catharticum</i>	Purging Flax	R	O	RO	O		O	OLF
<i>Lotus corniculatus</i>	Common Bird's-foot Trefoil	RLF	OLF	O	OLF		O	OLF
<i>Luzula campestris</i>	Field Woodrush					R	R	R
<i>Ophioglossum vulgatum</i>	Adder's tongue Fern						R	
<i>Pilosella officinarum</i>	Mouse-ear Hawkweed	R	R	R		R	R	
<i>Plantago lanceolata</i>	Ribwort Plantain	RO	OLF	O	OLF	O	RO	OLF
<i>Potentilla erecta</i>	Tormentil	RLO	O	RLO	O		VR	R
<i>Potentilla reptans</i>	Creeping Cinquefoil		R					R
<i>Potentilla sterilis</i>	Barren Strawberry	R	R		R			R
<i>Potentilla x mixta</i>	Hybrid Cinquefoil		R					RLF
<i>Prunella vulgaris</i>	Self-heal	O	R	O		R	OF	O
<i>Pteridium aquilinum</i>	Bracken	RLA	RLA	VLF	RLA	RLF	VLA	RLA
<i>Ranunculus acris</i>	Meadow Buttercup	R	R		R	R		R
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	RO		R	R	R	R	
<i>Ranunculus repens</i>	Creeping Buttercup	O	R		R	R	R	
<i>Rhinanthus minor</i>	Yellow Rattle							R
<i>Rumex acetosa</i>	Sorrel	R			R	R		R
<i>Sanguisorba minor</i>	Salad Burnet		R				R	R
<i>Scorzoneroide autumnalis</i>	Autumnal Hawkbit		R				R	
<i>Senecio jacobaea</i>	Common Ragwort	R	R	R	R			R
<i>Stellaria graminea</i>	Lesser Stitchwort		R	R	R			
<i>Taraxacum vulgare</i> agg.	Dandelion	R			R	OLF	R	
<i>Thymus polytrichus</i>	Wild Thyme						R	
<i>Tragopogon pratensis</i>	Goatsbeard						R	

Dolebury Warren		R1		R3		R6		
		2000	2015	2000	2015	1992	2000	2015
Trifolium dubium	Lesser Trefoil	R	R	R	R	R	O	R
Trifolium micranthum	Least Trefoil			R	R			
Trifolium pratense	Red Clover	R	R	R	R	RLF	R	R
Trifolium repens	White Clover	O	R	O		O	O	O
Urtica dioica	Stinging Nettle	R		R				
Veronica chamaedrys	Germander Speedwell		R		R	R	R	R
Veronica officinalis	Heath Speedwell		R	O	R			R
Vicia cracca	Tufted Vetch		R		R			
Vicia sativa	Common Vetch		R		R	R		R
Vicia sepium	Bush Vetch				R			
Viola hirta	Hairy Violet		R					
Viola riviniana	Common Dog Violet		R	R	R			R



Dyer’s Greenweed *Genista tinctoria* (left) and Sneezewort *Achillea ptarmica* (right)
Drawn by Tilda Lawrence

Victoria Park Bioblitz 2015

A natural history event with 900 people, 409 species
and one famous Victorian naturalist

Alex Morss

Introduction

It's not always obvious what precisely inspires a famous naturalist, or any naturalist, to embark on their lifelong quest to study nature. Perhaps it's sparked by an exciting discovery or experience, on their local patch. This thought brings us to Victoria Park in Bristol. Smack in the heart of Windmill Hill, sits a humble, 20-hectare green parcel, which this July attracted a huge herd of naturalists, considering that it's a rather modest site. Or is it?

Victoria Park is a very popular, large space in the centre of our 'Green Capital'.* A green island, walled in on all sides by urban distraction, the park is not famous for its biodiversity. From past management, its ecological value might be assumed to be low. However, during the past two years, volunteers from Victoria Park Action Group (VPAG, 2015 <http://vpag>), have successfully negotiated a wildlife management plan with the council, to improve the park's ecological value – bringing back uncut grassland, coppicing and native planting for pollinators.

It's still early days, but the potential for wildlife recolonizing is there, because the park lies on a crucial urban wildlife corridor through central Bristol. The site's potential importance was highlighted by the Urban Pollinator Network (Baldock *et al*, 2015a), by Avon Wildlife Trust (2015), and by pollinator researchers who recently used the park to study urban species assemblages (Baldock *et al*, 2015b).

A plant species inventory did not exist. A February 2015 BSBI working distribution map, in use by recorders in vice-counties 6 and 34, showed only 67 plant records were known for the entire monad ST5971 in which the park mainly lies. Many species had not been recorded on the BSBI Online Atlas for several decades (BRC, 2015).

So, with a nearly-blank template, our mission was to count all the wildlife, but also, importantly, to engage people with it. We hosted 900 Bioblitz visitors here over two days in July 2015. They probably didn't realise they were treading in the footsteps of a famous Victorian naturalist. Sir John Greville Smyth, of Ashton Court Estate, once unfamously owned Victoria Park. His elaborate, swirling ink signature lives on in the deeds of many of the old houses overlooking the park. It was part of his family's giant home estate, before Bristol City Council bought it in 1890 to create a 'green lung' for the smog, fume and coal-choked mine workers of Bedminster. Back then, the park was sheep pasture. What natural treasures did Smyth behold here, when he played as a child in this humble backwater that might have later inspired him to go on his global natural history quests?



Victoria Park Bioblitz

Smyth, born in 1832, used his substantial income to fund natural history adventures to all corners of the British Empire, in search of mammals, birds and insects. He donated his biological collection to Bristol Natural History Museum on Park Street. I searched the archives of the museum but they do not reveal anything in Smyth's files for Victoria Park. J.W. White's Bristol Flora gives the area no mention either, with Avon Gorge and other sites obviously stealing the show. Whatever biological heritage belonged to this wedge of land that became Victoria Park remains a mystery today, especially after so much land use transformation, industrial pollution and landscaping.

So our starting point was to look at what is still here, and engage as many people as possible in discovering, celebrating and enjoying our local wildlife patch, in the good old naturalist tradition. Our Bioblitz involved people of all ages in real citizen science, by collecting good baseline data on the park's biodiversity. Thanks to participants and our 60 amazing volunteers, we now know the park supports at least 409 species.

Methods

Our 900 participants, including a small army of naturalist experts, scoured all segments of the park, for plants, lichens, mammals, birds, invertebrates, amphibians and reptiles. We fell short of bryophytes and fungi... so there is something for another day. We enlisted 420 primary school children, aged 4 to 11, on Friday, led by guest experts, plus moth and bat experts on Friday evening and even more experts on Saturday. Participants learned lots about invertebrates and had a go at sweep netting and pitfall trapping. They used new LED-lit pocket microscopes. They used binoculars to search for birds. We dragged them enthusiastically through some hedgerows and scrub, for mammal tracking, using mammal survey tunnels that we'd baited with ink and food to capture footprints. They used hoop quadrats, magnifiers and botanical lenses to count wildflowers. They found out what a moth lamp did and how a bat detector works.



Matt from Avon Wildlife Trust and St Mary Redcliffe children



Neale assembling the moth trap

Results

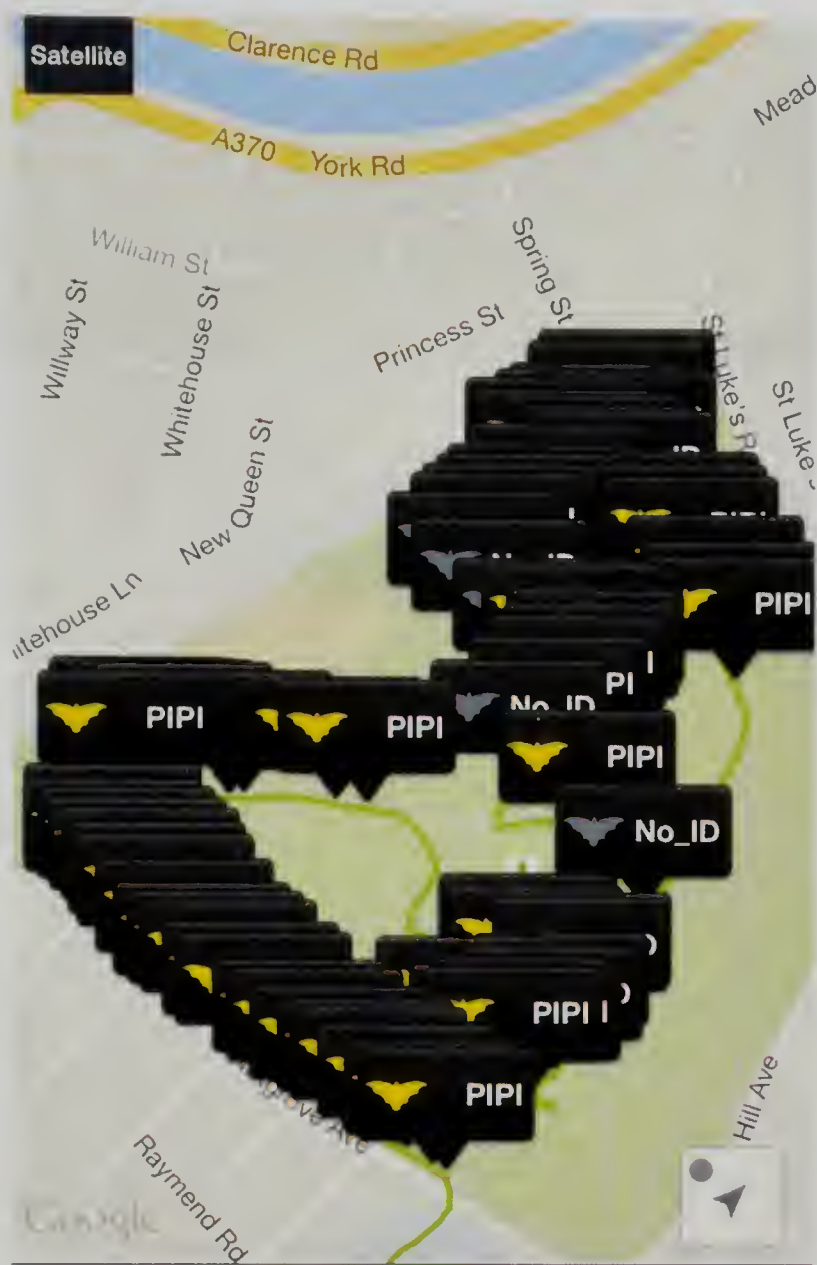
Teachers said the children didn’t stop talking about how much fun it was until the end of term, three weeks later! A species breakdown is given in the Table below. The biodiversity here may not join the same league as local nature reserves and the nearby SSSI, but I think a total of 409 seems pretty respectable considering the park has been managed for decades as short amenity grassland with a few trees and ornamental plantings.

Taxonomic group	Subdivision	Biodiversity count
Plants		204
Lichens		47
Mammals		12
Birds		21
Amphibians		2
Invertebrates		123
	Butterflies	10
	Moths	26
	Beetles	12
	Tree hoppers	3
	Lacewings	1
	Bugs	20
	Crickets	1
	Bees, wasps and ants	12
	Spiders	5
	Harvestmen	1
	Flies and hoverflies	27
	Other invertebrates	5

Species breakdown

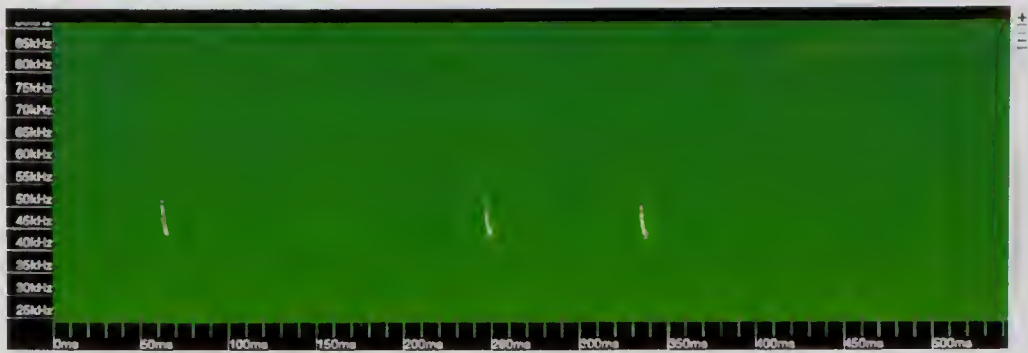
Discussion

Of note among those 409, it was pleasing to confirm the presence of a breeding hedgehog population. Nationally, they are of conservation concern and locally they are a priority species on Bristol’s Biodiversity Action Plan with an unknown local distribution. It was also good to record six different species of bat foraging in one urban park. GPS logs showed that their flight paths followed the trees and the new uncut meadow areas, which have been left with long grass for invertebrates.

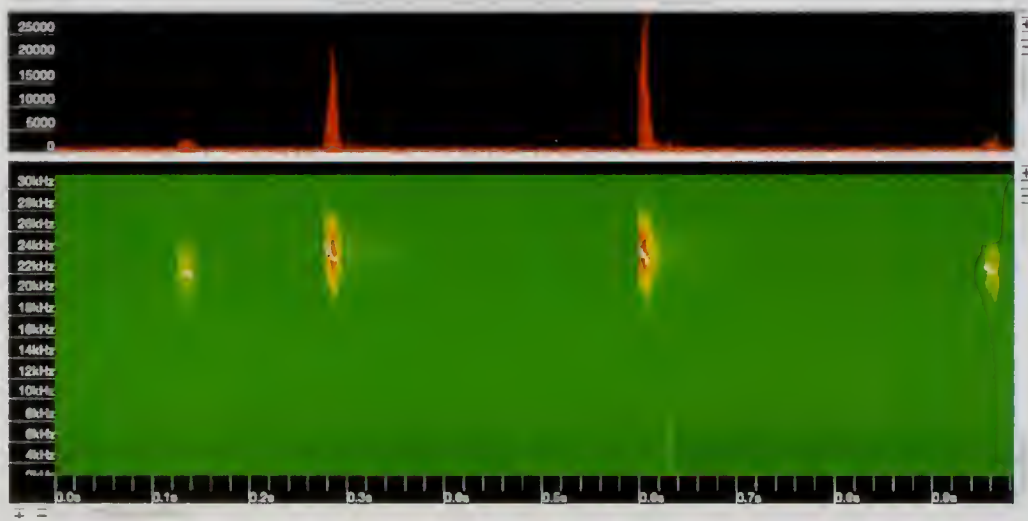


GPS log revealing bat foraging records in Victoria Park,
during one evening in July

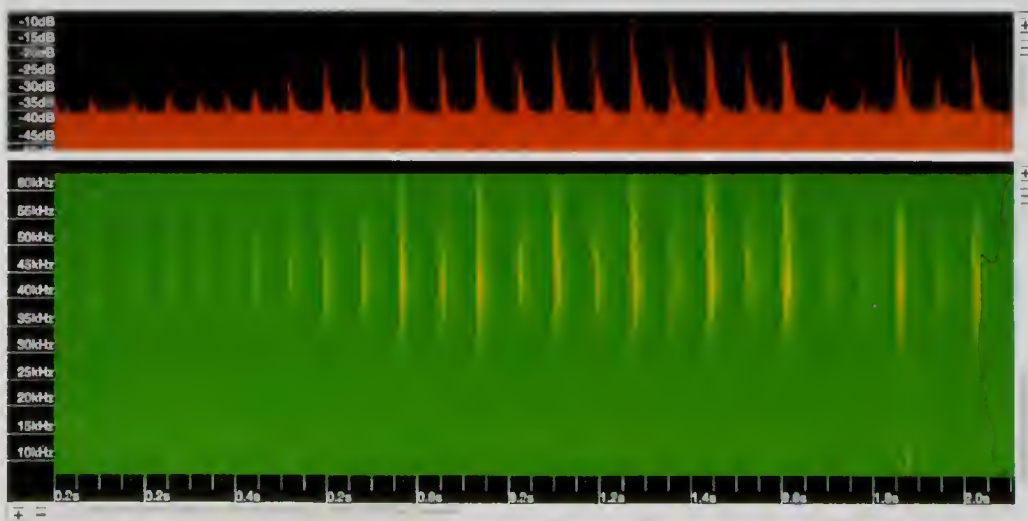
It was perhaps a little late in the season to record a great deal of bird activity, but 21 species were found nevertheless. No very unusual plants, although a new record cropped up for the alien White Wall Rocket, *Diplotaxis erucoides*, in one of the newly sown wildflower areas, found by Alex and verified by Tim Rich, who noted he'd not seen this as fresh local plant material for decades. A question mark remains on one tricky *Populus nigra* found in the steep woods, which differs from the park's planted hybrid poplars in having burrs and petiole hairs, like the rarer native black poplar, *ssp betulifolia*, as described by Meikle (1984). The habitat is surprising, so this tree remains to be verified by any botanist brave enough to tackle a poplar.



Sonogram showing Common Pipistrelle bat *Pipistrellus pipistrellus* echolocation calls



Sonogram showing Leisler's bat *Nyctalus noctula* echolocation calls



Sonogram showing Myotis bat *Myotis spp.* echolocation calls

Richard Bland noted that the avenues of trees are some of the finest in Bristol, and it is the only park with Eucalyptus, Cyprian Plane and Japanese Chestnut. There are Indian Chestnuts – an interesting experiment; and a very unusual variant of the Eastern plane that is the only one in Bristol. Richard noted there are two fine, veteran Small-leaved Limes that pre-date the park, and two Purple-leaved Sycamores, a tree that is rarely planted, and these are the two best in Bristol.

On Saturday, our celebration of nature continued with more wildlife searching, but also included some wonderful, wildlife-inspired arts and crafts creative activities, including chalk creature creations smothering every path in sight, 3D modelling to make Bristol's biggest bee colony out of scrap, with Sara Lee, to celebrate Get Bristol Buzzing. We met real baby hedgehogs, made clay hedgehogs and learned how to make a hedgehog hotel with Yvonne and Laura from Hedgehog Rescue. We made mud print studies of local leaves with Helen Adshead, we drew awesome and terrifying fantasy minibeasts inspired by the creatures we'd found, we learned that trees can draw pictures, powered by Rob Martin's wind-powered invention, and we heard wild stories from Martin Maudsley.

Returning to the question of what inspires and creates a naturalist, BNS member Tony Smith pointed out, in between scrutinising minibeasts with eager-eyed youngsters, that there is an apt quote by John Anderson, who wrote *A History of Natural History*: "It is much easier to get rid of things that one does not even recognise as being there, and, conversely, it is much harder not to care about things one has spent time studying." That, in a nutshell, is what this event was about.



Beth of BNHC with Newts

You can view the full species list and photos at www.alexmorss.co.uk and online, soon, at the NBN Gateway. You can view more photos and add your own photos to Victoria Park's new iSpot page (www.ispotnature.org/projects/victoriaparkbristol).

Thanks

Thanks to Bristol Naturalists' Society, which donated £500 to fund ecology survey equipment for the Bioblitz, which made the event such a good experience for everybody. This equipment is now available for BNS members to borrow, for future natural history endeavours. The event was organised by BNS member Alex Morss, who would like to thank everyone for their support, especially BNS, Bristol Natural History Consortium and its volunteers, Victoria Park Action Group, Avon Wildlife Trust, Mrs Brown's Café, the parents, staff and children of St Mary Redcliffe Primary School.

Reference List

- Avon Wildlife Trust. (2015). *My Wild City*.
Available at: www.avonwildlifetrust.org.uk/mywildcity
- Baldock, K.A., Belfin, B., Ahjokoski, T.B., Gardiner, J.C., Rogers, J.C., Steer, D.M., Whitehouse, A.E., Pattison, S.F., Birkin, G.M., Barsby, T.G. (2015a). *Greater Bristol Pollinator Strategy 2015-2020*. Available at: www.bristol.ac.uk/media-library/sites/biology/documents/GrBrisPollStrategy.pdf
- Baldock, K.C.R., Goddard, M.A., Hicks, D.M., Kunin, W.E., Mitschunas, N., Osgathorpe, L.M., Potts, S.G., Robertson, K.M., Scott, A.V., Stone, G.N., Vaughan, I.P. & Memmott, J. (2015b). 'Where is the UK's pollinator biodiversity? The importance of urban areas for flower-visiting insects'. *Proceedings of the Royal Society B: Biological Sciences*. 282
- BRC. (2015). *Biological Records Centre Online Atlas of the British and Irish Flora*. Available at: www.brc.ac.uk/plantatlas/
- Meikle, R.D. (1984). *Willows and Poplars of Great Britain and Ireland*. BSBI Handbook No 4. London: BSBI

Spider Hunting in Bristol

Mark Pajak

Extract from the Proceedings of the Bristol Naturalists' Society Vol1 Part1 1874:

*'The first Meeting of the Society was held at the Bristol Museum and Library, on the evening of January 2nd. Mr. Stoddart gave a Lecture on the Natural History of Spiders, which was illustrated with diagrams. After showing the distinction that clearly existed between Spiders and true insects, the author explained the minute anatomy of the Arachnida, and exhibited a large number of microscopic dissections. The list of Bristol specimens will appear in a future communication, when future observations shall have made it more complete, especially as many species usually considered as rare in Britain occur plentifully in the immediate neighbourhood; as, for instance, * Segestria perfida*, which is frequently met with.'*

* now *Segestria florentina* (figure 1).

It is interesting to note that in the 142 years since the first Bristol Naturalists' Spider meeting, the aspirational list of Bristol Spiders has not yet been published; however new and unexpected species are being recorded each year, or spiders not recorded for many years are rediscovered (Pajak 2012), such as the Purse Web Spiders of the Avon Gorge (figure 2). This lack in our current knowledge may be because spiders present challenges in their identification: it is usually not possible to represent enough features in a single photograph to name a species, and with well over 600 species in the UK a complete book would be impracticable. Good photographic guides are hard to find and although a 'Wild Guide' to Spiders is currently being produced by the British Arachnological Society, the out of print Dick Jones book is well worth getting hold of.



Fig.1: Tube Web Spider
(*Segestria florentina*)



Fig.2: Purse Web Spider
(*Atypus affinis*)

It is difficult to depict a spider with a single image in enough detail to allow identification to species. Abdominal colour results from the arrangements and shape of organs under the skin, which change depending on what the spider has eaten. Such guanocytes appear as white patches which can expand and contract as waste products are metabolised or with muscle contractions. Some spiders can do this on being startled, resulting in a fast colour change as white areas under the skin expand. The Flower Crab Spider (*Misumenia vatia*) can change colour entirely over many hours by absorbing or synthesising specific pigments to blend in with its surroundings. Metallic shining patches and iridescences are also not well illustrated in guides and many jumping spiders, which use visual cues to communicate, are much more beautiful live than when illustrated. Spiders can change colour between moults and a complete colour change allows camouflage against different substrates during different stages in development, such as the vivid yellow and black spiderlings of the Garden Cross Spider, which look almost invisible amongst Lichen on rocks (figure 3). This is in contrast to the adult colouration, of which variations may occur within the same species, though the white cross is always present (figure 4).

Many species exhibit sexual dimorphism not just in colour but in leg proportions and structure, making guidebooks only illustrating a single sex unreliable in the field. The male Money Spider (*Linyphia triangularis*) has massively enlarged mouthparts (as opposed to palps) which the female does not possess (figure 5). Spiders may be distinctive when viewed from the side but not from above and so you need to consider all angles of viewing when identifying a specimen. For others, the spider may be brown and nondescript, but behaviour may allow identification to genus – such as the female Wolf Spider who carries her offspring on her back for a few weeks after they hatch (figure 6). Time of year can be critical for some species, which in the juvenile stage cannot be identified to species as they have not developed the structures upon which the species descriptions are based. There are some species pairs which appear identical, but one species matures in Spring (*Meta mengei*) whereas its counterpart is usually found in September (*Meta segmentata*).

These idiosyncrasies cause difficulty for those armed only with a guidebook, but provide much interest and information for the seasoned spider hunter – taking in evidence from habitat, behaviour and web structure there are many clues beyond the immediately obvious to allow identification in the field. Such spider tales are wonderfully depicted in Bristowe's World of Spiders and amongst the detailed descriptions of Roberts (1996). Unfortunately these books are a bit bulky to cart around but they give great insight into the countless fascinating lives of spiders. There are no doubt many more interesting spider stories yet to be discovered and taking field notes on the time of year, abundance, microhabitat and web structure will help in gaining a better understanding of our arachnofauna. Bristol has much spider diversity to see including those species that live in houses (Pajak 2012) and those in our green spaces such as the Avon Gorge and Downs (Pajak 2013). Whilst

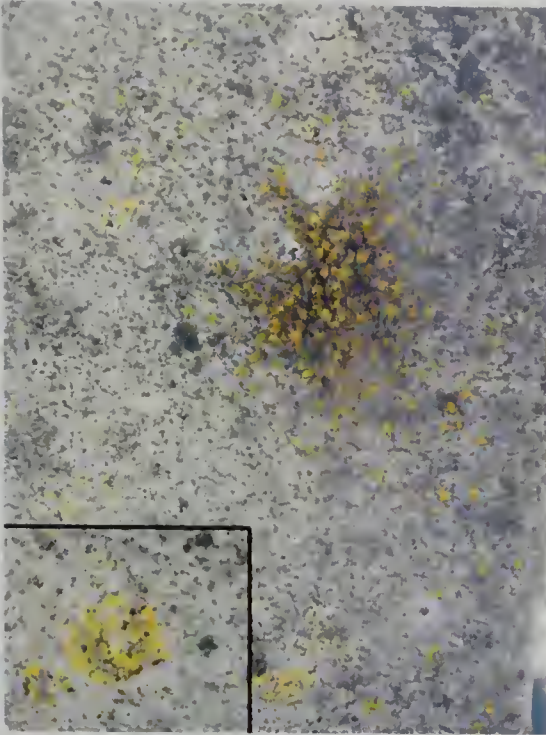


Fig.3: Garden Cross Spider
(*Araneus diadematus*)
spiderlings
Inset: Lichen on Stone

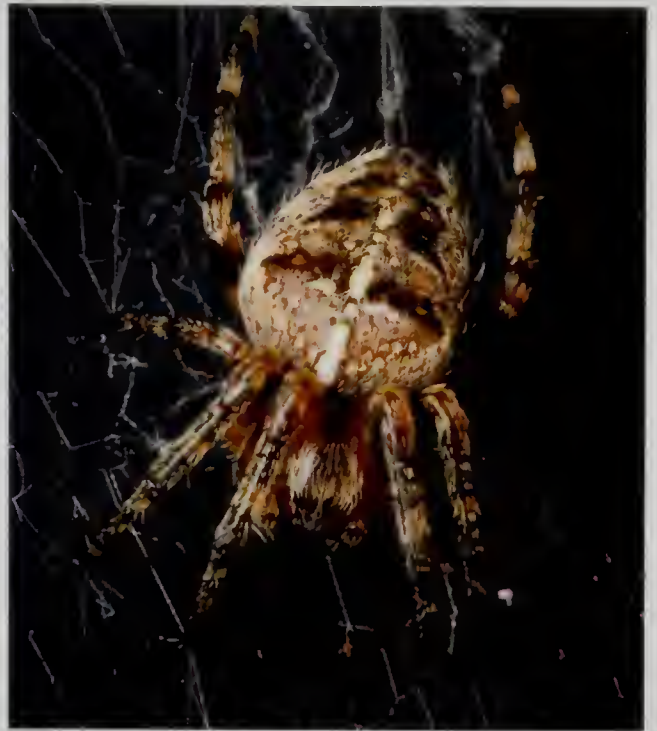


Fig.4: Garden Cross Spider
(*Araneus diadematus*) adult female



Fig.5: Spider (*Linyphia
triangularis*) adult male



Fig.6: Wolf Spider (*Pardosa* sp)
adult female with offspring

the hunt for rarer spiders is well worth the effort, given the lack of records we have, recording common species should also yield useful information about Bristol's potentially unusual spider diversity. Experimenting with different collecting

techniques and habitats will also yield different species, as many spiders are picky about the position to spin a web, or hide amongst leaf litter.

For the majority of web spinning spiders, the structure of the web can be used to tell the family to which the species belongs. The Lace Weaver (*Amaurobius* spp) possesses a thick comb on its rear leg which is used to backcomb silk into a flossy lace to snare passing insects (figures 7 and 8). The Tube Web Spider (*Segestria florentina*) is found exclusively within a silken tunnel from which radiate outwards several trip wires to give away the presence of passing insect prey. Orientation within a web is another clue to the name of the family – money spiders are found upside down in the sheet web whilst house spiders (*Tegenaria* spp) run on top of their webs. For many species the features required to identify them are too small to see with the eye, and require examination with a microscope against illustrations of the genitalia, but time spent at microscope is rewarded in the field, as it becomes much easier to know what to look for using a hand lens.



Fig.7: Lace Weaver Spider
(*Amaurobius ferox*)



Fig.8: Lace Weaver silk

Efforts by the BNS to record and gain a realistic understanding of our spiders have been so far outweighed by media subversion, as it appears that scandalous spider stories sell papers – from the purported invasion of False Widows to the slanderous reports of aggressive house spiders invading our homes in bad weather. Like them or hate them, we all have spider stories and enjoy a good yarn. Given the apparent public aversion to spiders there is at least heightened awareness of them and this presents an opportunity for us to inform. To this effect a display of Bristol's Spiders has been recently included in the Bristol Wildlife exhibition at Bristol Museum, where spiders are one of the most frequent requests for identification. Amongst these Tube Web Spiders (*Segestria florentina*, figure 1), Woodlouse Eating Spiders (*Dysdera crocata*, figure 9) and False Widows (*Steatoda grossa*, figure 10) predominate. The challenge for us therefore is to convert intolerance into interest and to build upon the public awareness to at least encourage recording of the more common species in order to generate understanding of how the city and parks

support the unusual diversity of Bristol's Spiders. One way this might be possible is to produce a guide for a specific area, such as the Avon Gorge Gully which offers some of the most unusual and rare spiders in the region. A guide that includes only species known to occur in an area should reduce the error margin and encourage participation in recording. The author is making plans with the Avon Gorge & Downs Wildlife Project for the production of a Spider Trail for the Avon Gorge Gully and welcomes suggestions for species to include and ideas for the layout.



Fig.9:
Woodlouse-eating Spider
(*Dysdera crocata*)



Fig.10:
False Widow
(*Steatoda grossa*)

References

- Bristowe, W.S. (1976). *World Of Spiders*. Collins New Naturalist 38.
- Jones-Walters, L.M. (1989). *Keys To The Families Of British Spiders*. Field Studies 9 (1989), 365-443.
- Pajak, M. (2012). *Silken Sunken Sock Sports Strange Spider Skin*. Bristol Naturalists News November 2012.
- Pajak, M. (2012). *Notes On Spiders Found In And Around A Basement Flat On Worrall Road Between 2010 And 2013*. Proceedings of the Bristol Naturalists' Society 2012.
- Pajak, M. (2013). *A Preliminary Summary Of Spiders Of The Avon Gorge And Downs*. Proceedings of the Bristol Naturalists' Society 2013.
- Roberts, M.J. (1996). *Spiders Of Britain & Northern Europe*. Collins Field Guide.

The Development of the University of Bristol Botanic Garden and its Rare and Threatened Native Local Plants Collection

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Abstract

In 2002 the decision was made to move the University of Bristol Botanic Garden (UBBG) from its then current location. This move would be the third in the Garden's history. The four core collections for the new Garden were selected in line with modern international policies on botanic garden management, recent research and the University of Bristol's teaching needs. The themes of these collections are Evolution, Rare and Threatened Native and Local Flora, Useful Plants and the Mediterranean Flora. This article describes development of the plant collection policy and collections, the vision and concept for the new Garden, together with a detailed explanation on the work to display the Rare and Threatened Native Plants Collection.

History and Background

The original University Botanic Garden in Bristol was founded by Adolph Leipner in 1882. A lecturer in German, Botany and Zoology he persuaded his employer that they should invest in a teaching garden that would be known as the 'botanic garden'. They agreed and provided an initial grant of £15, and by raising additional funds of £89 15s. 4½d., he was able to plant up the garden with 509 plants and purchase 247 packets of seeds (Delany and Winn, 2002). Further fundraising allowed for the construction of glasshouses and a small laboratory. When University College, as it was then known, obtained its royal charter in 1909 and became the University of Bristol, the original botanic garden, now known as the Leipner Garden, was well established. Leipner gained a reputation for popular botanical walks around Clifton and to the Avon Gorge, studying garden and native plants with his students. This is the first account of native plant study at the Botanic Garden.

The garden was much used and enjoyed by its students and soon outgrew the available space, forcing the establishment of a second garden known as the Field Garden adjacent to the Leipner Garden. In 1908 the University received a gift of £100,000 from tobacco magnate Henry Overton Wills, part of which was to be used for the construction of botany and zoology laboratories (which remained in use as the School of Biological Sciences until their relocation in July 2014). These were sited in the Leipner Garden whose focus would move to the much larger Field Garden.

In the 1920's the Field Garden flourished under the patronage of Hiatt Baker who became Pro-Chancellor of the University in 1929. The garden contained order beds, a conifer collection and many fine trees. New laboratories were built and student numbers increased. Hiatt Baker died in 1934. In 1939 the University commissioned a commemorative stone planter in memory of his life and work. This was sited at the heart of the garden which from 1938 had officially become known as the Hiatt Baker Botanic Garden. In the 1950's the expanding University needed purpose built administration offices to run its affairs. It was decided to locate these in the Hiatt Baker Garden and relocate the garden to Bracken Hill, at that time a new site 1.5 miles from the central University and near the Clifton Suspension Bridge, which had been gifted to the University in 1949 by Melville Wills, son of Henry Overton Wills.

In 1959 the plant collections were lifted and moved to the two hectare Bracken Hill site which contained a large Victorian family house, used as a student hall of residence, associated stable buildings surrounded by a fine Pulham's rock garden, formal Italianate pool and kitchen garden, small copse, many fine trees, shrubs and glasshouses. The former Victorian garden was gradually replanted over forty years to form a diverse teaching and conservation collection of plants with rare and threatened local native plants, New Zealand, South African, medicinal and economic plants as its core collections.

In 2000, as part of a University estate-wide property review, a report found that refurbishment of the main house as a hall of residence would be too costly and recommended the sale of the house. This threw the spotlight onto the future of the Botanic Garden. A separate Botanic Garden Steering Group chaired by Professor Sir John Beringer was set up in January 2002 to investigate and consider the options for the Botanic Garden. After considerable work and wide consultation with all user groups it was decided that the favoured option was to relocate the Garden to The Holmes, located in the heart of the Stoke Bishop student residential community. It was felt that by moving the Garden closer to the main student population, links and increased usage could be made of it as an educational and amenity resource.

The Holmes

Constructed in 1879 by William George the main house at The Holmes is set in 1.77 hectares of gardens near to the western edge of Durdam Down. The house, constructed of local pennant sandstone, was gifted to the University in 1943. Prior to its construction the land formed part of an extensive Elizabethan parkland owned by the Cann family, whose home (Stoke House, built in 1669) is located 200m to the west (Abbott, 1979). It is thought that the stone for Stoke House originated from the Holmes and created the dell. Ancient English Oaks *Quercus robur*, including one of 400 years at the adjacent Churchill Hall, and until 2004 a Sessile Oak *Quercus petraea* of 600 years grow in one corner of the garden. With a long history

of human settlement and elements of ancient pasture and woodland. The Holmes needed careful consideration when planning the new Botanic Garden. A Historic Landscape Survey Report (M. Lear 2003), an Ecology Report (Wessex Ecological 2003) and an Archaeological Survey (D. Hicks 2003) were commissioned to assess the site and provide relevant information as part of the planning application to establish a botanic garden. The garden has many fine non-native and native trees, including three large *Quercus robur*, a large *Carpinus betulus* and many fine Yews, *Taxus baccata*. With support from the City Tree Officer team many of the non-native trees of poor shape, unsafe condition and low or non-relevant botanical interest were removed to allow more light into the garden and to provide the opportunity for the establishment of a new tree population meeting the needs of the botanic garden.

Site Character

The Holmes is situated between 80m and 90m above sea level on a gently undulating site. To the south a paddock area faces due south and has been developed with a 604m² glasshouse containing five different temperature zones. To the north the site falls away giving a north west facing slope. This has been developed as the site of the Chinese Medicinal Herb Garden. The Holmes straddles the transition zone between two very different geological formations. From the dell northwards is Devonian Old Red Sandstone (370 million years old), while underlying the majority of the garden to the south is Lower Carboniferous Limestone (350 million years old). Both are hard and slow to weather and have been tilted and uplifted and now form the high ground across this part of Bristol. Both rocks influence the soil which is a silty clay and slightly alkaline overlying the Limestone while neutral to slightly acidic overlying the Old Red Sandstone. The presence of *Quercus petraea* indicates the slightly acidic nature of the soil towards the north of the site. The garden today sits in a leafy suburb of Bristol known as Stoke Bishop. Many fine ornamental trees adorn the streets and gardens. This mature tree cover provides considerable shelter from the prevailing south-westerly winds.

Developing a Vision for the New Garden

Early in the discussions about the future of the Botanic Garden it was identified that the primary role of the Botanic Garden should be to support teaching and research within the University. Additionally it was recognised that the Garden had an important role to play with its adult education programme and that links with schools and local community groups should be developed further, and within the local community the Garden should be developed as a cultural resource for the citizens of the city.

A key aspect of the role of the new Garden would be the uniqueness of its plant collections, particularly the Evolution and the Rare and Threatened Native Plants

Collections, to the Bristol area. Evolution would be the defining theme that would run through the whole garden. It would be a strong educational message that the Garden would make in its educational programmes and interpretation. The Rare and Threatened Native Plants Collection would be used as a conservation resource. This was seen as a crucial role that would help support the Garden's efforts towards the Global Strategy for Plant Conservation (Secretariat of the Convention on Biological Diversity, 2002).

To underpin the Garden's work the Mission statement was revised to reflect the Garden's focussed aims, and a motto was developed:

Our Mission:

To provide a diverse, correctly named, well labelled and attractively displayed teaching and conservation collection of plants in support of the University of Bristol's teaching and research endeavour and its educational commitments to the wider community.

Motto:

To educate, communicate and conserve.

This clear vision and mission statement would guide the new Garden's development.

The Main Influences on the Concept for the Botanic Garden

Three important factors have shaped the physical character and plant content of the new University of Bristol Botanic Garden.

1. The first was the publication of the Angiosperm Phylogeny Group (APG II, 2003) research into the relationships between flowering plant families derived from the sequencing of DNA contained within their genes.
2. Secondly, in 2002 the Global Strategy for Plant Conservation (GSPC) was developed by the world's Botanic Garden community and adopted by the Conference of the Parties of the Convention on Biological Diversity.
3. Thirdly, the comprehensive collection of plants numbering around 4500 species that had been assimilated since the gardens foundation in 1882.

These three points would have a profound effect on the design of the new Garden, shape its appearance and build a new Garden with a strong and unique character. But it is the Global Strategy for Plant Conservation that would have the biggest effect on the Rare and Threatened Native Plants Collection.

The Global Strategy for Plant Conservation (GSPC) 2002, with its sixteen distinct targets has provided a clear point of reference during the initial concept and later design phase of the Botanic Garden. In particular, Target 14 which highlights the need to promote public understanding and education of the importance of plants and Target 8 which highlighted the need to have 60% of native plants in viable *ex-situ*

collections by 2010 have been carefully considered in the design. The GSPC 2010 - 2020 second edition Target 5 highlights the need to have at least 75 per cent of threatened plant species in *ex situ* collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes. The University Botanic Garden has always had a prominent local native plant display (first assembled by Dr Mark Smith, Superintendent of the Garden 1972 - 1984). This policy was developed further by incorporating recommendations laid down in the GSPC to showcase our rare and threatened local flora.

The plant collections which formed the botanic garden at Bracken Hill were reviewed in 2003. The existing plant collections were reorganised into four concise core collections. Each would be distinct and have a dedicated role in teaching, education and conservation and would accommodate the best and most relevant of the plant collections established at the old garden at Bracken Hill. The four themed core collections are:

- (i) The Plant Evolution Collection, incorporating the New Zealand and South African plant collections.
- (ii) Plants of Mediterranean Climatic Regions, incorporating the European, Western Cape of South Africa, Southern and Western Australia, Central and Northern Chile and Western Californian plant collections.
- (iii) The Rare and Threatened Native Local Plants Collection, incorporating the native flora of the Bristol area and South West Peninsular.
- (iv) The Useful Plants Collection, incorporating the European and Chinese Medicinal plants and Economic plant collection.

These carefully chosen core collections would fulfil the teaching, research and conservation requirements of a small University Botanic Garden in the 21st Century.

From Core Collections to Concept Design

It was this design that was adopted. A key element was disabled access. This was achieved by an organic flowing network of paths built to the latest Disability Discrimination Act (DDA) standards that lead visitors through all the main plant displays and allowed the Garden to reveal itself slowly, thereby increasing its perceived size (Leadlay & Greene 1998).

Core Collections and how they are represented in the new Garden.

The Rare Local Flora and Threatened Native Plants Collection has been greatly expanded within the new Garden in line with modern botanic garden policies,

(Wyse Jackson, Sutherland, 2000) and (Cheney *et al.*, 2000) with the development of seven interconnecting habitats that occur locally in the Bristol and West Country area. These are located prominently near to the Garden entrance and are home to many nationally scarce and threatened plants and some locally endemic species. The Garden's primary path network was designed to flow directly through the display allowing visitors to see close at hand some of the most important local plants that would be difficult or near impossible to see in the wild due to their inaccessibility or the danger associated with their habitat.



(Left) Bristol Onion *Allium sphaerocephalon* flowering with Western Spiked Speedwell *Veronica spicata* subsp. *hybrida* in the Avon Gorge display. (Centre) Wild Leek, *Allium ampeloprasum* flowering in mid summer. (Right) Flower heads of *Allium ampeloprasum*, *Allium ampeloprasum* var. *babingtonii* growing in the Coastal cliffs and hills section.

The seven habitats created together with examples of some of the key threatened species grown are listed here:

1. Calcareous grassland and scrubland overlying Carboniferous Limestone, illustrating the flora of the Avon Gorge and Mendip Hills.

Allium sphaerocephalon, *Arabis scabra*, *Anisantha madritensis*, *Dianthus gratianopolitanus*, *Sorbus bristoliensis* (endemic), *S. wilmottiana* (endemic), *Trinia glauca*, *Veronica spicata* subsp. *hybrida*.

2. Calcareous grassland overlying Oolitic Limestone, illustrating the flora of the Cotswold Hills and river valley systems.

Daphne mezereum, *Fritillaria meleagris*, *Juniperus communis*, *Pulsatilla vulgaris*, *Salvia pratensis*.

3. Seasonally flooded sedge peat meadowland, illustrating the flora of Somerset Levels.

Dactylorhiza praetermissa, *Myrica gale*, *Osmunda regalis*.

4. Woodland edge, illustrating the local hedgerow and woodland edge flora.

Stachys alpina, *Ornithogalum pyrenaicum*, *Lithospermum purpureo-caeruleum*, *Melittis melissophyllum*.

5. Calcareous and neutral woodland, illustrating the flora of Leigh Woods and the Mendip Hills.

Carex depauperata, *Sorbus anglica*, *S. eminens*, *S. porrigentiformis*, *S. torminalis*.

6. Coastal cliffs and hills, illustrating the grassland flora and the transitional flora between dunes and dune slack to coastal meadows.

Allium ampeloprasum, *Allium ampeloprasum* var. *babingtonii*, *Althaea officinalis*, *Eryngium campestre*, *Helianthemum apenninum*, *Matthiola sinuata*, *Rumex rupestris*, *Scirpoides holoschoenus*.

7. Lake and pool edge, illustrating the aquatic flora of rhynes and ditches

Menyanthes trifoliata, *Ranunculus ophioglossifolius*.



The Avon Gorge Display with *Allium sphaerocephalon* and *Veronica spicata* subsp. *hybrida* in full flower

Of strategic importance is the Avon Gorge, Leigh Woods and Mendip Hills display which has been carefully and sympathetically built using local water-worn Carboniferous limestone reclaimed from the original garden at The Holmes.

Carboniferous limestone pavements were systematically surface quarried from the Mendip Hills, Somerset in late Victorian and Edwardian times. The rock was almost exclusively transported to Bristol to satisfy the fashion for suburban rock gardens and grottos. To better display the individual pieces of rock the existing rock garden was dismantled in May 2008 and rebuilt ensuring that rocks with the strongest characteristics were better displayed and that the topography was raised creating a 'mini Avon Gorge' and Mendip Hill area. The area is now home to many of the local iconic plant species which flourish in the well-lit, well drained conditions.

One of the largest displays created is a calcareous meadow. The display which was first sown in September 2011 and oversown in March 2012 and September 2012 has 45 broad-leaved perennials and 12 species of grasses, the most important of which is the Quaking Grass *Briza media*, whose delicate flower heads nod in the slightest of air currents. It is one of the first to drop its seeds, which are heavy and fall near the parent plant, but due to their cup-like shape they catch the wind and blow over the surface of the soil. This plant is associated with species-rich calcareous grassland and prefers thin open communities of plants to flourish.



Calcareous meadow in full flower in July

The grass sward has been sown in a specially prepared soil. The original soil, some of the richest in the new garden, had to be removed to start the project. Recycled elsewhere in the garden, it was replaced with a poor quality soil obtained from a reclamation company onto which was spread 100mm of 10mm-to-dust carboniferous limestone chippings. The two components were then rotovated together to produce a well-drained soil. A further 100mm of 10mm-to-dust carboniferous limestone chippings were spread on top of the mix and this was rotovated shallowly so that upper levels of the underlying mix were mixed with this new material. The result is gradation of limestone chippings to dust down to soil. The whole area after firming was covered in a further 20mm of limestone chippings.

Now resembling a beach, the material was sown with seed collected with permission from Durdham Downs. Plants were selected carefully to avoid introducing too many strong growing grass species which would have produced a thick sward and given little opportunity for broadleaved plants to establish. Three growing seasons on the dynamics of the project are as interesting as the actual plants. There are still areas where plant populations are thin, others where plants have covered the gravel surface and subsequent deposits of dead leaves are starting to build into surface veneer of soil. To keep an open habitat, some grasses, notably Wall Barley *Hordeum murinum*, were thinned to reduce the size of the population. Others like the *Briza media* have their seed collected and resown to avoid them dying out.

In 2014 flowering spikes of Wild Clary *Salvia verbenaca* appeared for the first time. This deep rooted perennial is relatively common on calcareous grassland throughout Southern Britain. Numerous small tubular flowers in whorls on erect spikes to 30cm arise from a flat rosette of leaves. The calcareous meadow has attracted abundant insect activity ensuring successful pollination and good seed set. Pale Flax *Linum catharticum* is easily overlooked, because of its thin wiry stems, diminutive leaves and small stray flowers. It bends in the wind amongst the grasses and until one sees the flowers it can be confused as one.

The dominant plant in July and August is the Lesser Knapweed *Centaurea nigra*, with their multi-stemmed habit, bearing dark green foliage they are the dominant feature of the display. The population of *Centaurea nigra* is being monitored and may be reduced to balance the display into a more natural representation of a wild calcareous meadow. Each plant bears up to a hundred flower heads which are actually a composition of many small individual flowers forming an inflorescence. Bright pink in colour and protected by a black edged calyx, they are rich in nectar and attract many insects. Their rapid growth is attributed to a deep root system which after two years has penetrated down through the gravel rich substrate to the underlying rich silty-clay soil – the results are clearly visible.

In contrast the grasses, whose fibrous root systems explore only a few centimetres into the ground, struggle in the dry surface conditions. To reduce their vigour

further the introduction of Yellow Rattle *Rhinanthus minor*, a hemi-parasite which attaches its seedling root onto the roots of its host, has reduced the vigour of the grasses. Unlike other true parasites the hemi-parasite has green leaves and will photosynthesize like any other green plant. Clearly visible with its hooded bright yellow flowers in May and June, it is easily pollinated and by mid-July all trace of flowering has ceased. The flat circular seed pods contain circular winged seeds, which rattle in the seed capsule when shaken, allowing it to live up to its common name of Yellow Rattle. Other plants of note are Cowslips *Primula veris* which flower well in spring and Ladies Fingers *Anthyllis vulneraria* which has established itself in the open habitat. Through the summer months the grass stands tall punctuated with colourful flowers.

Mowing is not done until the end of August allowing plenty of time for seeds to ripen and fall. One of the design objectives was to create a flowing swath of natural grassland adjoining a neatly mown path that runs down to the large pool. The view that that sweeps across this part of the garden is an important vista of the botanic garden.

The meadow is just one area that lends itself to use as an outdoor classroom, where students can learn about plants by being immersed in them. The diversity of the calcareous meadowland is recorded each summer by garden volunteer & FODAG (Friends of the Downs and Avon Gorge) member Martin Collins and Bristol Naturalist past President, Richard Bland. The information gathered is building up an interesting picture of the development of this significant display.

Other elements of the Rare and Threatened Native Plants Collection will be developed in the future thereby further enriching this important and unique part of the Botanic Garden.

The Future

The Garden is taking on an increasing role in the public understanding of science. A new electronic database provided by Iris Botanic Garden database systems linked to a label printer/engraver will improve the quality of individual plant labels. Further work by third year biology students will provide new and innovative interpretation for students and visitors to learn about the Rare and Threatened Native Local Plants Collection, whilst themed events and exhibitions attract new audiences. As the Garden continues to diversify and its plant displays mature more people visit, particularly those taking garden tours. This is the most high value way of seeing the Garden at its best and learning something new about the plant collections grown.

With the natural world and our ability to use it wisely facing an uncertain future, we are confident that the new University of Bristol Botanic Garden will enthuse people, be a centre for teaching and research and enable us to communicate the important messages about the wonderful world of plants. The Garden is well placed to ‘educate, communicate and conserve’.

References

- APG II (2003). *An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APGII*. Botanical Journal of the Linnean Society, 2003 141, 399-436.
- Low, B & Rebelo, T (1998). *Vegetation of South Africa, Lesotho and Swaziland*. Department of the Environment Affairs & Tourism, Pretoria.
- Lawrence, D. & Higgins, R. (1 September 2003). *Ecological Report for the Holmes*. Bristol.
- Hicks, D. Aifa (29 August 2003). *Archaeological Survey of the Holmes and Goldney House and Gardens*. University of Bristol, Bristol.
- Leadlay, E. & Greene, J. (1998). *Darwin Technical Manual for Botanic Gardens*. Botanical Garden Conservation International (BGCI) London, U.K.
- Cheney, J., Navarro, N. & Wyse Jackson, P. (2000). *Action Plan for Botanic Gardens in the European Union*. National Botanic Garden of Belgium.
- Lear, M. (18 September 2003). *Historic Landscape Survey of the Holmes*. Oxford.
- Delany, R. & Winn, G. (2002). *How Did This Garden Grow? The History of the Botanic Gardens of the University of Bristol*. Bristol: Friends of Bristol University Botanic Garden, Bristol.
- Secretariat of the Convention on Biological Diversity (2002). *Global Strategy for Plant Conservation Decision VI/9*. World Trade Centre, Montreal, Canada.
- Abbott, S. (1979). *100 years of the 'The Holmes' 1879 – 1979*.
- Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., & Donoghue, M.J. (2002). *Plant Systematics a Phylogenetic Approach, Second Edition*. Sunderland, MA: Sinauer Associates, Inc.
- Wyse Jackson, P.S. & Sutherland, L.A. (2000). *International Agenda for Botanic Gardens in Conservation*. Botanic Gardens International, Kew, Royal Botanic Garden Kew, UK.

Bristol & District Invertebrate Report 2014

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Introduction

The beginning of 2014 was marked by personal tragedy for those living on the Somerset Levels whose houses were flooded, some for weeks, as a consequence of the very wet spring. From a dispassionate perspective, one wonders about the impact such standing water must have had on the local invertebrate fauna. In addition, regarding the residents' understandable demands following the flooding for more clearance of drainage channels and rhynes, one wonders again about the impact upon ecosystems and the species represented on the Levels, some of them very rare. Balancing the protection of life and property in a crowded island with the best opportunity for the wildlife can sometimes present difficult choices. Managed retreat from rising sea levels may be another instance which we may have to face increasingly in the south-west. In the meantime we can but monitor the impact of the flooding and resultant work upon the local ecosystems in that part of the county.

Closer to Bristol and Bath, in 2014 there was the usual mix of sightings reflecting how dynamic the natural world is, with some species being rediscovered that had not been seen for some time (eg Sallow Clearwing Moth), others being found as they have just colonised the area (eg Jersey Tiger Moth), some which may have been present but overlooked in the past (eg the micro-moth *Acleris umbrana*), some which are migrants occasionally visiting our area (eg Lesser Emperor Dragonfly) and others which perhaps experienced a better year than recently (eg Wall and Grayling butterflies). Trying to monitor and account for these changes is what makes invertebrate recording so fascinating.

That fascination includes never knowing what surprises may be in store from one year to the next. Roger Symes reported seeing on 30 May 2014 what he took to be the bug *Eurydema dominulus* at St Mary's Walton, Clevedon. It will be interesting to see if this species is seen again in 2015 in our region to confirm its presence. A single record of a Scarce Merveille du Jour moth, well away from its usual haunts in southern England was another surprise unlikely to be repeated?

This year I have included in the list below a number of common species in the UK but ones which we rarely receive records of. These are our marine invertebrates where even the humble shore crab rarely gets reported, let alone our marine molluscs. I have also included several records of clearwing moths showing the advantage of choosing the best method of recording, in this case the use of pheromone lures. I have also added one important record for 2013 of the poorly recorded leafhoppers.

Finally, the Society's anniversary field trip to Steepholm on 16 June was notable for the striking abundance of a relatively small number of species such as the common froghopper *Philaenus spumarius* and the beetle *Lagria hirta*, whilst many familiar species, such as the common weevil of nettles *Phyllobius pomaceus*, were absent. The overgrown nature of the vegetation dominated by bramble, led to a somewhat disappointing experience for the entomologist.

Scientific nomenclature follows that used by the National Biodiversity Network website (www.nbn.org.uk).

My thanks to all who have submitted records directly to the Society, particularly to Jon Mortin, Andy Pym, John Martin, John Aldridge, Bob Fleetwood, Jean Oliver, Dave Nevitt, Chris Iles, Darrel Watts, Tony Smith, Mark Pajak, Tony Cotterell, John Burton, Marcus Rhodes, Paul Bowyer, Neale Jordan-Mellersh, Jean Oliver, Jean Hathaway, Richard Pooley, Martin Evans, Des Bowring, Rich Andrews, Mike Bailey, Grant Burleigh, Mary Wood, Lois Pryce, the Bristol Regional Environmental Records Centre (BRERC), members of the Clevedon Moth Group, Bristol & District Moth Group and the Bristol Wildlife E-group. The importance of receiving, not just the records picked out here, but those of perhaps less noteworthy species cannot be understated in terms of monitoring the ever changing status of the invertebrate fauna.

Species of note in 2013, additional to those published last year

INSECTA (Insects)

Hemiptera, Homoptera (true bugs)

Acericerus ribauti Nickel & Remane The Sisters, 82 Ashley Road, Montpelier, Bristol (vice county 34) ST595741 25 October 2013 Tony Smith, confirmed by Dr Alan Stewart, found by beating from Maple. A few recent records in SE England, this is the first from the west country.

Species of note in 2014

INSECTA (Insects)

Archacognatha (bristletails)

Petrobius brevistylis Carp. Marine Lake, Clevedon, North Somerset ST397 711 (vice-county 6) 28 September 2014 Jon Mortin. Not a species reported often.

Odonata (damselflies and dragonflies)

Calopteryx splendens (Harris) **Banded Demoiselle** River Avon, Keynsham, Bath & NE Somerset ST6570, 6569, 6669, 6768 (vice county 6) 3 July 2014 John Aldridge. The high numbers make this worthy of note, 600+ seen on the day.

Anax parthenope (Selys) **Lesser Emperor Dragonfly** Chew Valley Lake, Bath & NE Somerset ST5 5 (vice county 6) 23 June 2014 per Bristol Wildlife e-group. A single record in our region this year of this now fairly regular migrant from continental Europe.

Orthoptera (grasshoppers and crickets)

Metrioptera roeselii (Hagenbach) **Roesel's Bush-cricket** Three Brooks Nature Reserve, Bradley Stoke, South Gloucestershire ST62 81 (vice county 34) 4 July 2014 Rupert Higgins. Ashton Court, North Somerset ST553 719 (vice county 6) 9 August 2014 Tim McGrath. This species, which has been established near Bath for few years now following expansion of southern populations, does seem to be spreading in our region.

Hemiptera (true bugs)

Rhyparochromus pini (L.) **Goblin Combe**, North Somerset ST477 652 (vice county 6) 26 May 2014 Ray Barnett, one swept. A species also found in the Avon Gorge and other calcareous grassland sites in our region. Nationally Scarce.

Lamproplax picea (Flor) **Weston Moor**, North Somerset ST44 73 (vice county 6) 2 October 2014 Bob Fleetwood, det. J. Flanagan. A very local species associated with *Sphagnum* bogs. The first record for our region.

Leptoglossus occidentalis Heidemann **Western Conifer Seedbug** Bath Spa University Campus, Newton St. Loe, Bath, Bath & NE Somerset ST69 64 (vice county 6) 30 October 2014 Darrel Watts. Autumnal reports of this large and impressive bug have dropped in the last couple of years.

Notonecta obliqua Thunb. **St Andrews Park**, Bristol ST593 751 (vice county 34) 4 March 2014 Jon Mortin. We have few identified records of aquatic bugs from recent years.

Lepidoptera (butterflies)

Lasiommata megera (L.) **Wall** Sandford, North Somerset ST42 59 (vice county 6) 4 August 2014 Kurt Vickery. The Wall has been at very low numbers in the region for many years now and it is encouraging that it still remains at this site.

Hipparchia semele (L.) **Grayling** Ashton Court, North Somerset ST54 72 (vice county 6) 1st week of July 2014 Phil Quinn. Not seen at this site for a long time, a species which has become rare and localised in the region.

Lepidoptera (micro-moths)

Incurvaria praelatella (D. & S.) **Lord's Wood**, Pensford, Bath & NE Somerset ST63 63 (vice county 6) 20 June 2014 Bob Fleetwood. A species which had not been seen in the region in a century.

Ochlisenheimeria taurella (D. & S.) Bleadon Levels, North Somerset ST314 570 (vice county 6) 16 August 2014 Ray Barnett, one swept. A species which is not recorded at light and so may be under-recorded. Nationally Scarce.

Argyresthia trifasciata Staud. Milton, Weston-super-Marc, North Somerset ST3 6 (vice county 6) 5 May 2014 Paul Bowyer. Dundry, Bristol ST557 670 (vice county 6) 2 June 2014 Dave Nevitt. First recorded in 2004 and now well established, breeding on juniper and Leyland Cypress in gardens and parks.

Acleris umbrana (Hb.) Clevedon, North Somerset ST39 69 (vice county 6) 9 January 2014 and another on 30 March 2014 Paul Chapman, first confirmed by genitalia dissection by Mike Bailey. Dundry, Bristol ST557 670 (vice county 6) 18 October 2014 Dave Nevitt. Clevedon, North Somerset ST398 708 (vice county 6) 2 November 2014 Bob Fleetwood, one photographed. A species which seems to be increasing at present.

Crociosema plebejana Zell. Bishopston, Bristol ST587 754 (vice county 34) 22 October 2014 Rupert Higgins, at light. Possibly colonising our area from the south.

Gillmeria ochrodactyla (D. & S.) Trooper's Hill, Conham, Bristol ST628 731 (vice county 34) 18 July 2014 Ray Barnett, Bristol & District Moth Group meeting, one at mv light. A very local species in the region. Nationally Scarce.

Oncocera semirubella (Scop.) Clevedon, North Somerset ST39 69 (vice county 6) 18 July 2014 Bob Fleetwood. An extremely local species in the region.

Diasemiopsis ramburialis (Dup.) **Vagrant China-mark** Dundry, Bristol ST557 670 (vice county 6) 16 October 2014 Dave Nevitt, one at light. A rare immigrant to the British Isles and a first for the region.

Palpita vitrealis (Rossi) Weston-super-Marc, North Somerset ST3 6 (vice county 6) 21 November 2014 Paul Bowyer. An occasional migrant.

Lepidoptera (macro-moths)

Sesia heunbeciformis (Hb.) **Lunar Hornet Moth** Easton, Bristol ST6074 (vice county 34) 8 July 2014 Bob Fleetwood. Attracted to a pheromone lure.

Synanthedon flaviventris (Staud.) **Sallow Clearwing** Lower Woods, South Gloucestershire ST7 8 (vice county 34) 2014 Rupert Higgins. Confirmed at the only known locality in the region after an absence of records for many years.

Synanthedon andrenaeformis (Lasp.) **Orange-tailed Clearwing** Walton Common, North Somerset ST4273 (vice county 6) 29 June 2014 Bob Fleetwood. Attracted to a pheromone lure.

Synanthedon myopaeformis (Borkh.) **Red-belted Clearwing** Plantations Lakes, Kingston Seymour, North Somerset ST393672 (vice county 6) 22 June 2014 Bob Fleetwood. Attracted to a pheromone lure.

Synanthedon vespiformis (L.) **Yellow-legged Clearwing** Walton Common, North Somerset ST4273 (vice county 6) 29 June 2014 Bob Fleetwood. Attracted to a pheromone lure.

Cyclophora puppillaria (Hb.) **Blair's Mocha** Clevedon, North Somerset ST398 708 (vice county 6) 15 October 2014 Bob Fleetwood, one at light. A rare immigrant not recorded in the region since the 1950s.

Idaea trigeminata (Haw.) **Treble Brown Spot** Bishopston, Bristol ST587 754 (vice county 34) 15 October 2014 Rupert Higgins. A common species but this record is noteworthy as it presumably represents a rarely recorded second brood.

Lampropteryx otregiata (Metc.) **Devon Carpet** Gordano Valley, North Somerset ST43 73 (vice county 6) 24 July 2014 Paul Bowyer & Dave Nevitt. Known from the main Somerset Levels further to the south, this is the first record from the North Somerset levels. A species which may be increasing nationally.

Pachycnemia hippocastanaria (Hb.) **Horse Chestnut** Clevedon, North Somerset ST39 69 (vice county 6) 14 August 2014 Paul Chapman. One to light. A very rare species in our region (where the appropriate habitat is lacking) and thought to be from migration from adjacent colonies eg on the Somerset coast to the south.

Hypena rostralis (L.) **Buttoned Snout** Keynsham, Bath & NE Somerset ST652 677 (vice county 6) 21 May 2014 Roger Palmer. Crew's Hole, Bristol ST62 72 (vice county 34) 21 November 2014 Lee Gardiner per Avon Birds blog site. Chew Valley Ringing Station, Bath & NE Somerset ST56 58 (vice county 6) 22 November 2014 per Mike Bailey. The Bristol record is an extension of its known area of occurrence in the region of this species which hibernates as the adult moth.

Euplagia quadripunctaria (Poda) **Jersey Tiger** Brean Down, Somerset ST2859 (vice county 6) 3 August 2014 Paul Bowyer. Keynsham, Bath & NE Somerset ST650 683 (vice county 6) 14 July 2014 John Aldridge. Bishopston, Bristol ST587 754 (vice county 34) 28 July 2014 Rupert Higgins and also in Bishopston ST588 754 9 August 2014 Jean Oliver. Becoming established and likely to become common.

Moma alpium (Osbeck) **Scarce Merveille du jour** Clevedon, North Somerset ST40 69 (vice county 6) 6 June 2014 Howard Taffs, one at light. A very surprising and first record for the region. Presumably a wanderer from colonies further to the east and south east of our region.

Helicoverpa armigera (Hb.) **Scarce Bordered Straw** Elm Farm, Burnet, Bath, Bath & NE Somerset ST66 65 (vice county 6) 17 October 2014 Philippa Paget. A fairly regular immigrant.

Anaplectoides prasina (D. & S.) **Green Arches** Dundry, Bristol ST557 670 (vice county 6) 22 October 2014 Dave Nevitt. A common species but not at this time of year, presumably evidence of a second brood this year.

Sideridis albicolon (Hb.) **White Colon** Weston-super-Mare, North Somerset ST3 6 (vice county 6) 27 May 2014 Oliver Smart. A rare, coastal species.

Mythimna vitellina (Hb.) **The Delicate** Elm Farm, Burnet, Bath, Bath & NE Somerset ST66 65 (vice county 6) 17 October 2014 Philippa Paget. An immigrant but not a common visitor to our region.

Coleoptera (beetles)

Trechus rubens (Fabr.) Lawrence Weston Moor NR, Bristol ST545 791 (vice county 34) 29 March 2014 Ray Barnett, one under log, the first record for our region. Nationally Scarce.

Elaphropus parvulus (Dej.) Clevedon, North Somerset ST398 708 (vice county 6) 15 April 2014 Bob Fleetwood, one in garden. A very local species and the first record for our region. Nationally Scarce.

Bembidion doris (Panz.) Lawrence Weston Moor NR, Bristol ST545 791 (vice county 34) 29 March 2014 Ray Barnett, one under log, the first record for the region of this wetland species.

Amara consularis (Dufts.) Trooper's Hill, Conham, Bristol ST628 731 (vice county 34) 18 July 2014 Ray Barnett and Bristol & District Moth Group meeting - mv light, and the first record for the region. Nationally Scarce.

Margarinotus merdarius (Hoffmann) Sommerville Road, Bristol ST594 751 (vice county 34) 16 May 2014 Jon Martin. The 2nd record for the BRERC database.

Harmonia quadripunctata (Pont.) **Cream-streaked Ladybird** Sommerville Road, Bristol ST594 751 (vice county 34) 11 May 2014 Jon Martin. Rarely recorded in the region.

Anatis ocellata (L.) **Eyed Ladybird** Keynsham, Bath & NE Somerset ST64 68 (vice-county 6) 30 March 2014 John Aldridge (Bristol wildlife e-group). Under recorded in the region.

Pyrochroa coccinea (L.) **Black-headed Cardinal Beetle** Brislington Brook, Bristol ST622 720 (vice county 34) 30 May 2014 Ray Barnett and Bristol & District Moth Group at mv light. A local species in the region. Nationally Scarce.

Agapanthia villosoviridescens (DeG.) Severn Way, Severn Beach, South Gloucestershire ST537 838 (vice county 34) 21 June 2014 Jon Mortin. Hollywood, South Gloucestershire ST57 81 (vice county 34) 30 June 2014 Rupert Higgins. A distinctive longhorn species becoming established in the region, 3rd and 4th records for the region.

Cryptocephalus aureolus Suff. Goblin Combe, North Somerset ST477 652 (vice county 6) 26 May 2014 Ray Barnett, one swept, a calcareous grassland species. Nationally Scarce.

Chrysolina oricalcia (Müll.) Narroways LNR cutting, Bristol ST602 750 (vice county 34) 16 March 2014 Jon Mortin. One dead adult found. Nationally Scarce.

Chrysolina staphylaea (L.) Chew Valley School Wood, North Somerset ST569 623 (vice county 6) 17 January 2014 Jon Mortin. Two seen.

Platyrhinus resinosus (Scop.) Kings Weston Estate, Bristol ST544773 (vice county 34) 6 July 2014 Jon Mortin. A Nationally Scarce species with a stronghold in our region.

Hymenoptera (bees, wasps and ants)

Zaraea lonicerae (L.) Sommerville Road, Bristol ST594 751 (vice county 34) 13 April 2014 Jon Mortin. The second record on the BRERC database, probably not uncommon in gardens.

Auplopus carbonarius (Scop.) Bishopston, Bristol ST5 7 (vice county 34) 2014 Moira Byrne, det. Rhian Rowson. The characteristic pots constructed by this wasp are more often recorded than the adults; primarily a species of SE England. Although recorded in 2014 the pots could date from earlier years. Nationally Scarce.

Lasius brunneus (Latr.) **Brown Ant** Penpole Wood, Kings Weston, Bristol ST534772 (vice county 34) 6 July 2014 Jon Mortin. One worker ant identified on a Yew. Nationally Scarce.

Diptera (true flies)

Ctenophora pectinicornis (L.) Twerton, Bath, Bath & NE Somerset ST72 64 (vice county 6) 5 June 2014 Mike Williams. A very striking species and Nationally Scarce.

Sericomysia silentis (Harris) Leigh Woods Tow Path, Bristol ST56 73 (vice county 6) 2014 Tony Cottrell. A large species associated with wetland sites but can exploit wet ditches.

Xanthandrus comtus (Harris) St Andrews Park, Bristol ST593 751 (vice county 34) 6 December 2014 Jon Mortin. A Nationally Scarce species and migrant recorded at a very late date.

Villa cingulata (Meig.) Leigh Woods Tow Path, North Somerset ST56 73 (vice county 6) 2014 Tony Cottrell. Previously only reported from the top of Leigh Woods (eg Stokeleigh Camp, Leigh Woods, North Somerset ST557734 (vice county 6) 6 July 2014 Des Bowring), interesting to now have a record from the tow path at the base of the woods as well.

Phlysocephala rufipes (Fabr.) Kings Weston Estate, Bristol ST544 772 (vice county 34) 6 July 2014 Mark Pajak. A conopid fly less often seen than *Sicus ferrugineus*, for example.

ISOPODA (woodlice & slaters)

Ligia oceanica (L.) **Common Sea Slater** Marine Lake, Clevedon, North Somerset ST397 711 (vice county 6) 28 September 2014 Jon Mortin. Sand Point, North Somerset ST319 659 (vice county 6) 19 October 2014 Jon Mortin. Not a species regularly reported by naturalists in our region.

AMPHIPODA

Orchestia gammarellus (Pallas) Severn Way, Severn Beach, South Gloucestershire ST536 837 (vice county 34) 29 November 2014 Jon Mortin. A very poorly recorded group in our region.

DECAPODA (crabs)

Carcinus maenas (L.) **Green Shore Crab** Marine Lake, Clevedon, North Somerset ST397711 (vice county 6) 28 September 2014 Jon Mortin. Although a common species, not one regularly reported by naturalists in our region.

ANNELIDA

Polychaeta (worms)

Arenicola marina (L.) **Blow Lugworm** Sand Point, North Somerset ST330 646 (vice county 6) 19 October 2014 Jon Mortin. A common species but one rarely reported by naturalists in our region.

MOLLUSCA

Bivalvia (bivalves)

Macoma balthica (L.) **Baltic Tellin** Severn Way, Severn Beach, South Gloucestershire ST536 837 (vice county 34) 29 November 2014 Jon Mortin. A very poorly recorded group in our region.

Nationally Scarce – Occurring in 16-100 hectads in Great Britain. Excludes rare species qualifying under the main IUCN criteria.

Weather Report for 2014

Richard Bland
rbland673@gmail.com

The BNS began publishing weather data in 1872 with G. F. Burder’s paper on rainfall in Clifton since 1853, and this led me to search for temperature data back to that date. From 1920 until its closure in 2002 the Long Ashton Research Station published this data, and since then I have used the Times daily report for Bristol, although since 2000 I have used my own rain gauge. There is an excellent website at www.afour.demon.co.uk which has also traced records from some other sources back to 1853, and I have used these to fill in the gaps. A long series is crucial to any understanding of the continuous processes of climate change, which is normally defined as the average of the previous thirty years’ data. I use the term ‘long-term average’ to mean the average back to 1853. Most meteorologists use the mean daily temperature as the basis, but many sources only quote daily maxima and so I have used these figures throughout.

Summary for 2014

The year was the warmest since 1853, beating the previous record set in 1921 by half a degree. January and February were the wettest since 2002, July was the driest since 1999, and September was the driest since 2003. Several months were hotter than usual; January was the hottest since 2008, March since 2003, June since 1976, September was the second hottest since 1865, and overall the autumn was the hottest ever recorded. The year as a whole was slightly wetter than normal.

Year	2005	06	07	08	09	10	11	12	13	2014
Av. Max. °C	14.4	14.7	14.5	13.7	14.6	14.2	15.5	14.7	14.8	16.1
Ten year av. °C	14.2	14.4	14.4	14.3	14.3	14.3	14.4	14.5	14.5	14.7
Rainfall <i>mm</i>	896	952	1107	1150	986	747	847	1420	799	1143
Ten year av. <i>mm</i>	956	974	997	1005	993	943	945	981	983	975

Table 1: Average mean maximum temperature and rainfall. The second and fourth rows give the average for the ten years up to and including the year referred to.

Seasons

Winter (December 2013 to February)

Average temperature was 9.9°C, two degrees above the long-term average. Rainfall averaged 139mm per month, 75% above normal, all three months being very wet. There were 16 frost nights (October to April), the last on March 24th. The average for the past decade is 29 per winter, and it was the fewest since 2006. No snow fell and ponds were never frozen.

Spring (March to May)

Average temperature was 15.3°C, the same as 2012, two degrees above the long-term average. Rainfall was average at 65mm per month.

Summer (June to August)

Average temperature at 22.5°C was similar to 2013, two degrees above the long-term average. Rainfall at 87mm per month was a little above average, but August was very wet.

Autumn (September to November)

Average temperature at 17.0°C was slightly above the previous record set in 1921. Rainfall at 80mm per month was average.

Seasonal Comparisons

To put the 2014 seasonal average temperatures into perspective, Table 2 shows the seasonal temperature extremes, with their year, the average since 1853, and the difference between 2014 and the long term average. Table 3 gives the same detailed information for rainfall. Winter rainfall was heavily influenced by December, as both January and February were dry months.

	2014	Min.	Max.	Av. since 1853	Diff.
Winter	9.9°	1917 - 2.5	1920 - 10.6	7.5°	2.4°
Spring	15.3°	1887 - 10.4	1893 - 16.6	13.0°	2.3°
Summer	22.5°	1883 - 18.0	1976 - 23.9	20.3°	2.2°
Autumn	17.0°	1915 - 10.6	1959 - 16.8	14.0°	3.0°
Annual	16.1°	1892 - 12.1	1921 - 15.6	13.7°	2.4°

Table 2: 2014 seasonal average temperature compared with minimum, maximum and average since 1853.

	2014	Min.	Max.	Av. since 1853	Diff.
Winter	139mm	1964 - 21mm	1995 - 154mm	79mm	60mm
Spring	66mm	1893 - 17mm	1981 - 107mm	60mm	6mm
Summer	87mm	1995 - 11mm	2012 - 149mm	74mm	13mm
Autumn	80mm	1978 - 26mm	1935 - 173mm	80mm	0mm
Annual	87mm	1864 - 49mm	2012 - 118mm	75mm	12mm

Table 3: Average monthly rainfall in mm for each season in 2014 showing the maximum, minimum and average since 1853, and the difference between 2014 and the average since 1853.

Monthly percentage deviation in 2014 from the average since 1853

The temperature in January and February was notably warmer than average, and the rainfall in January, February and August was also notably above average while March, July and September were drier, see Table 4.

	Temp.	Rain			Temp.	Rain
January	32%	101%		July	19%	-59%
February	31%	105%		August	-2%	117%
March	27%	-54%		September	23%	-80%
April	23%	19%		October	18%	-6%
May	9%	65%		November	22%	52%
June	17%	-34%		December	20%	-31%

Table 4: Monthly percentage deviations in 2014 from the norm

Monthly Summary 2014

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Temp. °C	9.4	9.9	12.5	15.7	17.6	22.6	24.9	20.1	22.1	16.6	12.1	9.3	16.1
Rain mm	169	127	28	68	102	41	31	189	16	189	134	62	75

Table 5: 2014 monthly average temperatures and total rainfall with average for the year in the last column

January

A succession of depressions swept across the Atlantic bringing frequent strong SW winds, temperatures were two degrees above normal, and rain fell on all but nine days. There were three frosty nights.

February

The January pattern continued, with rain falling on 22 days, SW winds, and average weekly temperature rising from 7°C to 11°C over the month. There were three frosty nights.

March

High pressure set in on 7th and dominated for the rest of the month, with light winds bringing 24 dry days with sunshine peaking at 11 hours on 16th. Temperatures were two degrees above average.

April

The month was dominated by high pressure throughout with mostly light southerly winds and 19 days without rain, temperatures were around 16°C, peaking at 20°C on 19th, and rainfall was average.

May

Low pressure dominated from 5th to 14th with strong SW winds, a heat wave from 14th to 19th culminated in a temperature of 26°C. This was followed by a low pressure system that brought NE winds, a fall in temperature to 12°C on 24th, with some recovery by the end of the month. There were 15 dry days, but above average rainfall, half of which fell between 21st and 24th.

June

High pressure took control from 9th and dominated for the rest of the month, with very light N or NE winds, clear skies, and temperatures that reached 27°C on 23rd. Rainfall was below average with 24 dry days.

July

For much of the month there was very little pressure gradient across the country, winds were light and variable, and the weekly average temperature rose steadily to reach 31°C on 24th and 25th. Very little rain fell and there were 21 dry days. Ten days had over ten hours of sunshine and only two were overcast, although total sunshine was less than in this month in 2013.

August

The first week was fine and warm, but low pressure settled over the Baltic bringing ten days of NW winds, falling temperatures and between 9th and 14th over a month's worth of rain, with 42mm on 11th alone, the wettest day of the year. There were, however, 14 days without rain, and sunshine and temperatures were average.

September

The first three weeks were dominated by high pressure over the Baltic, bringing light NE winds, generally overcast skies, but 27 days were without rain. Day-time temperatures remained in the twenties throughout, and it was the driest September since 2003. The wind switched to the west on 22nd, but brought little other change.

October

A sharp contrast with September, the month was dominated by low pressure over Iceland or the central Atlantic, moderate W or SW winds and a sharp fall in temperature in the first two weeks reaching 12°C on 14th, after which there was a recovery reaching a record 22°C on the last day of the month. There were 12 dry

days and nine overcast, average rainfall but the temperature was still 2°C above the October average.

November

The warm pattern continued, with temperatures between 10°C and 14°C throughout, and no frosts. The month was dominated by high pressure over the Baltic, with light SE winds from a still warm continent.

December

A large high pressure area developed over the Azores, and kept depressions sweeping well north of the UK. Moderate westerly winds, little rain and only six frost nights ensured that maximum temperatures remained around 10oC all month until the last weekend of the year.

Weather Extremes

	Year	2005	'06	'07	'08	'09	'10	'11	'12	'13	'14
Temp. of hottest day	°C	30	35	27	28	28	26	29	30	32	31
Temp. of coldest day	°C	0	0	2	2	-1	-5	1	1	0	4
Rainfall on wettest day	mm	47	39	40	35	36	36	40	72	33	42
Hours of sun on sunniest day	Hours	14.8	14.7	14.1	14.9	14.7	15.6	14.7	15	15	13.3
Longest dry spell	Days	14	22	24	16	20	24	23	17	20	17
Longest wet spell	Days	7	11	8	8	8	7	5	15	9	7
Number of night frosts	Nights	32	33	25	44	42	76	22	41	67	15
Number of days with snow	Days	2	2	2	1	19	33	0	1	8	0
Number of stormy days (30mph+)	Days	20	27	22	16	17	9	24	22	25	28
Number of days hotter than 25°C	Days	14	27	1	7	5	3	14	19	32	27
Number of days colder than 5°C	Days	26	39	18	14	37	60	13	16	29	2
Number of days with 10+hr sun	Days	38	36	45	29	49	46	44	38	44	39
Number of days with no sun	Days	89	107	99	95	95	106	104	93	95	82
Number of days with no rain	Days	248	234	238	228	265	269	253	205	238	203

✦ Table 6: Summary of weather extremes for the past decade

Table 6 gives figures for the extreme annual events over the past decade, enabling the events of 2014 to be put in perspective. There seems to be no pattern in these figures. It is also interesting that, contrary to common perception, two days in every three (about 65%) have no rain at all although in 2014 this dropped to about 55%.

A note on climate

Climate is defined as the normal weather measurements over a period of time, usually thirty years. Because it is an average it changes only slightly in each particular year. Weather varies much more widely from year to year than climate does in centuries, and birds like all other wildlife respond to the changing conditions they experience on a daily basis. Data gathered over the last decade on the Downs in Bristol suggests that as a general rule a change of one degree Celsius in average temperature will lead to a week's change in the average timing of events for both plants and birds, although individual species may respond more quickly than this. The weather changes that have occurred since the last ice age have led to continual change in the wildlife that can thrive here, and this process continues. Seasonal change, such as the very warm spring and summer in 2014, can have a much more dramatic effect on bird populations, and Table 7 shows the climate figures for each season for the past decade. They make it clear that over this period spring has warmed rapidly and that summer has become wetter, but that the other seasons have remained stable.

	2005	06	07	08	09	10	11	12	13	2014
Winter C°	7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.9	8.0
Spring C°	13.0	13.1	13.1	13.2	13.3	13.3	13.3	13.3	13.5	13.4
Summer C°	20.3	20.3	20.2	20.2	20.3	20.3	20.4	20.4	20.5	20.5
Autumn C°	14.3	14.4	14.4	14.4	14.4	14.4	14.5	14.5	14.5	14.6
Winter, mm	86	87	89	88	88	86	87	87	87	88
Spring, mm	65	67	68	69	68	67	64	65	63	64
Summer, mm	66	67	68	69	70	70	72	74	74	76
Autumn, mm	92	91	91	93	95	95	93	94	94	94

Table 7: Annual average temperature and rainfall for the past thirty years

Ida Roper, first lady President of the BNS

Richard Bland

Ida Roper was born 150 years ago last August 29th in Bristol. Eugene Byrne, a historian who writes a long monthly article called Bristol Times within the Bristol Evening Post, contacted me for information. Her obituary was published in our *Proceedings* in 1935, accompanied by a photograph, and there was an article about her herbarium by Mary Beckett of Leeds University which was published in the *Proceedings* in 2003. Eugene did a good deal of further research, and was helped by the Bristol & Avon Family History Society. He sent me a copy of the article, and permission to use it for our journal if we wished.

Ida Roper was a remarkable lady, who clearly played a large part in this Society for most of her life. She was a lady of independent means who became a fine botanist. J.W. White, who produced his *Flora of Bristol* in 1912, thanked her for her trustworthy and energetic support, and for assistance in literary research and in revision and correction of the proofs. As the book is 722 pages long, with an index listing some 2,500 items, this must have been a heroic endeavour. The fact that she was elected President in the year following the publication is itself evidence of the esteem in which she was held, as the leadership of the society had been, and was to remain, exclusively male for many years.

Her first formal post was that of sub-librarian in 1904. She was to remain in charge of the library until her death in 1935. The Library still possesses many of her own books, but also hundreds of volumes of journals, many obtained by exchange, from a wide variety of other natural history societies, and national organisations such as the Zoologist, and the Linnean Society, as well as a remarkable number of geological journals. At the time Geology and Botany were the Society's two major concerns. There is also a good deal of material, as yet uncatalogued, in our own archives.

Looking after the Library might be thought to have been a big enough job on its own, but on retiring from the Presidency in 1915 she became both Editor of the *Proceedings* and Secretary of the Society, and she was to continue in these positions for the rest of her life. The times were clearly very difficult. Few objects speak more redolently to me of the impact of the war on society than the few fragile and decaying copies of the *Proceedings* for the war years that we still have, the paper cheap and thin, the publication often two years late, the articles short. She clearly played a major role in supporting the continued existence of the society through dark times, and enabling it to recover in the post war period.

Perhaps her greatest triumph came in 1930 when she was responsible for hosting the meeting of the British Association for the Advancement of Science for its meeting in Bristol. But she also was personally responsible for maintaining a wild flower

display in the City Museum, which she began in 1911 and which was maintained every week until 1923. I quote from Eugene Byrnes article.

"Her display was one of the most popular things about the Museum (which was then housed in what is now Brown's restaurant). At any one time there were 20-25 items on show, which a few being added or removed on most days. For 13 years without a single break the display case was filled with local flora through all seasons. She tried to make sure the display included the first flower of spring and the last of the end of summer. The display was particularly popular during the First World War, both with local people and with wounded soldiers, who were given tea parties at the Museum three times a week."

She wrote a number of articles for the *Proceedings*, the first in 1909, all on botanical subjects, and often these were summaries of talks she gave to the Society. She was also a member of the short-lived Bristol University Botanical Club. But Botany was not her only interest. She was the first female member of the council of the Bristol and Gloucester Archaeological Society, wrote some papers for its journal, and published a book on Effigies in Gloucestershire.

She built up a herbarium of over 10,000 plants, most of them local, but others gathered by exchange with other enthusiasts, which was clearly a popular way of sharing understanding. This was left in her will to Leeds University, as Bristol did not have the space to store it, and it was recently curated by Mary Beckett, who wrote extensively about it in our *Proceedings* for 2003. One remarkable feature was the fact that plants that she had collected are now widely spread around museums as a result of the practice of exchange. They can be found in Oxford, Nottingham, Liverpool, the National Museum of Wales, Ulster and the British Museum.

She died in 1935 and is buried in Arncliffe cemetery where her grave is apparently in poor condition. Perhaps the society should find ways of ensuring that this is put right, and that her significance to both ourselves and Bristol is better recognised.

Bristol Naturalists' Society Annual Report 2014

Organisation

The AGM was held on March 6th. David Hill became President of the Society with the following re-elected as Officers – Secretary: Sheila Quin, Treasurer: Stephen Fay, Membership Secretary: Margaret Fay, Bulletin Editor: David Davies, *Proceedings* Editor: Richard Bland, Librarian: Jim Webster, Archivist: Clive Lovatt, and Webmaster: Mark Pajak. Clive Lovatt, Mark Pajak, Hannah Broughton, Richard Ashley and Mike Johnson were chosen to represent the Sections whilst Roger Steer, Ray Barnett, Tim Corner, Robert Muston, Becky Belfin and Mandy Leivers were chosen as ordinary members. Sheila Quin subsequently stood down and Lesley Cox was co-opted as Secretary. The role of Publicity Secretary remains vacant.

The Society had a very busy year with its regular field meetings and winter lectures being augmented by an increase in the number of collaborations with external organisations, such as the Bristol Natural History Consortium (BNHC) who ran BioBlitzes, whilst the Bristol Green Capital Partnership has also had the benefit of leading members' time and expertise during the somewhat unwieldy preparations for next year's Green Capital Status.

The Society's relationship with the RSPB deepened with plans for the launch of a joint Swift Initiative next year and regular collaborations continued through, for example, our surveys in conjunction with the BTO, broadcasts on BCfm's *Shepherd's Way* and other local joint endeavours such as botanical meetings with neighbouring groups in Somerset and Gloucestershire, similar joint arrangements in Geology and, of course, our continuing friendship with the Bristol Ornithological Club.

At the Natural History Awards organised by the BNHC, three Society members were recognised. Richard Bland was given *The Bristol Award* for Life Time Achievement and Alex and Marcus Rhodes were jointly given the *Young Green Volunteer Award*, whilst the Society itself was highlighted for its work in the Avon Wildlife Trust's Magazine; *Wildlife*.

2014 also marked the centenary of a BNS visit to Steep Holm in the Bristol Channel in 1914. Accordingly, a return visit was arranged to this fascinating, island Reserve in the Bristol Channel. New and comparative records will now form another benchmark for future activity and future generations.

▶

Grants

The Society gave £3,490.35 during the year in grants, as follows: -

£2000: To the Avon Wildlife Trust towards the cost of Interpretation Boards for their newest Reserve in the making – Bennett's Patch and White's Paddock.

£500: To Hilary Raeburn (*Butterfly Conservation*) towards the publication of *Butterfly Walks in Somerset and Bristol*.

£500.75: To Alex Rhodes (*Portbury Wharf Ringing Station*) for mist nets and bird ringing equipment.

£319.60: To Bob Buck (*St George's Flower Bank*) for Reserve signs and some protective posts.

£170: For the publication of the leaflet, *The Downs' Lichen Trail*.

However, a £1,000 unspent grant to BRERC was returned until required as the timescale for its deployment had changed.

Library

2014 has seen various important initiatives taking place of which the most notable was the beginning of the process to achieve the restoration of the historically important Coal Field Maps and Fern Print Collection held by the Society. Advice from Ray Barnett and other Museum staff was an import element in this process and through their knowledge and advice, the services of a professional Conservator was obtained. Further improvements in display conditions have been discussed with a view to future implementation.

Archives

Digitisation of the *Proceedings* has also begun thanks to arrangements made by the archivist, Clive Lovatt, via the Biodiversity Heritage Library, which is now in the process of making this invaluable historical record available to all interested parties worldwide through the modern medium of the Internet. Whilst general work continued, this major step forward involved detailed discussions with the Biodiversity Heritage Library and, despite initial copyright problems arising from the issue of the joint publication of the *Avon Bird Report*, an arrangement whereby the digitisation of all *Proceedings*, with the caveat of a two year moratorium on current editions, is in place, with the digitisation of the *Avon Bird Report* to follow under similar arrangements.

Section Reports

a) Botany Section Annual Report 2014

Seven indoor meetings and fifteen field meetings were held in the year under the auspices of the Section, with an additional five on the trees and plants of the Bristol Downs led by Richard Bland for the Society and Bristol's Festival of Nature. Notices and accounts of the meetings can be found in the BNS monthly Bulletin, *Bristol Naturalist News* together with various botanical notes and photographs.

Indoor meetings included two annual members' evenings (January and December) and talks covered Bristol alien plants, Atlantic Hazel Woods, wild roses, the natural history of orchids and Gloucestershire bryophytes.

Some of the field meetings were held jointly with the Somerset Rare Plants Group and the Gloucestershire Naturalists' Society's Botanical Group, who also publish the most important plant records their respective sides of the Bristol Avon. The best attended field meetings were those closest to Bristol, including the ever-popular tree-gazing walks led by Tony Titchen.

Botanical highlights include the sight of several times more *Allium sphaerocephalon* in flower in the Gully than perhaps has ever before occurred, and a glorious day at and near Walton Common when Rob Randall showed us *Rosa agrestis* and Mark Kitchen recognised *Centunculus minimus* – and on the way home, two of us found *Erica cinerea* again on the slopes below the Bristol Downs.

Peter Hilton and Clare and Mark Kitchen retire from the Botany Committee who extend their grateful thanks for many years of support and leadership. Justin Smith, known to many of us for his outstanding knowledge of lower plants, shared in the meetings he led for us, died in his late 40's early in the year and an appreciation appears in the April 2014 Bulletin. Charles Copp who promoted the early work for the Flora of the Bristol Region (2000) died in 2009 and is noticed in the December 2014 Bulletin.

We are particularly grateful to the external speakers, all of whom brought enthusiasm and left inspiration, and to the leaders of the field meetings for taking us to such interesting places. The Secretary also thanks the Committee for their organisational support throughout the year.

Clive Lovatt, Hon Secretary

b) Geology Section Annual Report 2014

The Geology Section AGM was held on 29 January 2014 when the following Officers were elected: – President: Roger Steer, Secretary: Richard Ashley Field Secretary: Richard Ashley and Committee members: Gordon Hobbs and Simon Carpenter. The AGM was followed by members' talks.

The following Lecture meetings took place during the year:

26 February – Sauropods and their Long Necks by Dr Mike Taylor.

26 March – Quaternary Geology and Geomorphology of the Coast of the Bristol Region by Dr David Case

26 November – The Practice of Geology Fieldwork by Dr Mary Benton

A programme of West Country Geology Field Trips and visits was arranged jointly by the Geology Section, Bath Geological Society and the West of England Geologists' Association Group. Meetings arranged by BNS Geology Section were:

18 March – Bristol City museum Geology Store by Deborah Hutchinson

3 May – Priddy Minery Environmental Effects of Lead Mining by Charlie Bacon

16 August – Hock Cliff, Frotherne, Gloucestershire by Richard Ashley

In addition on 2/3 October members of the Geology Section lead by Simon Carpenter were involved in a project to clear a new section of the Lower Lias on the Saltford Railway Path. This was funded by a grant from the Geologists' Association.

The Section would like to record its thanks and appreciation to Bristol University's Department of Earth Sciences for allowing the use of the S H Reynolds Lecture Theatre for its winter meetings and other support.

Richard Ashley

c) Invertebrates Section Report for 2014

This year we were able to include all the Bioblitzes and other events coordinated by the Bristol Natural History Consortium at various local nature reserves (LNRs) across the city and included a few of our own. The AGM at the City Museum on 19.01.14 confirmed Mark Pajak as President and Tony Smith as Hon Sec for the year and this was followed by a workshop on the identification of Flies (diptera). We supported the Festival of Nature over the w/c 14th and 15th May and the Avon Gorge and Downs event on 12th July. All our other scheduled meetings were field events.

18.05.14 Meadowsweet field and Fishponds Brook woodlands; BNS

31.05.14 The Ardagh, Horfield Common LNR; BNS with BNHC

01.06.14 Dundry Slopes LNR; BNS with BNHC and AWT

29.06.14	Stockwood Open Space, Brislington; BNS with BNHC
05.07.14	Three Brooks LNR, Bradley Stoke; BNS with BNHC
06.07.14	Penpole Wood LNR, Kings Weston Estate; BNS with BNH
13.07.14	Narrowways Junction LNR, St Werberghs; BNS with BNHC
20.07.14	Magpie Bottom LNR, Bryant's Hill, Hanham; BNS with BNHC
26.07.14	Callington Road LNR, Brislington; BNS with BNHC
03.08.14	Filnore Woods LNR, Thornbury; BNS
13.09.14	Zoological Gardens Bioblitz; BNS and the Zoo.

Species records from all these events have been passed to the Bristol Regional Records Centre (BRERC).

Tony Smith

d) Ornithology Section Annual Report 2014

Summary

As usual, the Section has had a very busy year; details below. It began with the AGM of 2014 and a fascinating, detailed talk, which summarised many years of research into the Buzzards of the Gordano Valley area. This was one of five excellent talks held during the winter months whilst thirteen field meetings were held during the year across Wales, Somerset, Bristol, Wiltshire and South Gloucestershire. Periods of inclement weather, with rain and high winds in early summer, lowered attendances on some field events.

Highlights of species recorded on field meetings during the year include: White-winged Black Tern; Marsh Harrier; Hobby; Common Sandpiper; Kingfisher; Water Rail; Little Owl; Hawfinch; Goshawk; and Crossbill. Records are submitted to BRERC and/or BirdTrack.

Members of the Ornithology Section were part of the team who took part in a number of national and local Surveys and Bioblitzes as well as special events, such as the *Centenary Visit To Steepholm*. In addition, members of the Section played a key role within the Society and in formulating its links with outside agencies such as the RSPB and BTO as well as with more local organisations such as the Bristol Natural History Consortium and the Bristol Nature Network. Richard Bland was honoured to receive *The Lifetime Achievement Award* from the Consortium, as was Alex Rhodes who was awarded the *Young Green Volunteer Award*. We continue to enjoy reciprocal arrangements with the BOC. Section members have also played a significant role in the preparations for the Society's input into Bristol's Green Capital Year and continue to do so.

Field Meetings (13)

- January: Sunday, 19th – **Uphill and Axe Estuary**. Leader: Mike Johnson.
February: Saturday, 8th – **Avalon Marshes**. Giles Morris.
March: Sunday, 23rd – **Nagshead, Forest of Dean**. Leader: Ed Drewitt
April: Saturday, 19th – **Sand Point**. Leaders: Sue and John Prince.
May: 1. Saturday, 10th – **Velvet Bottom**. Leader: Giles Morris.
2. Wednesday, 21st – **Ashton Court**. Leader: Richard Bland.
June: 1. Sunday, 22nd – **Newport Wetlands**. Leader: Mike Johnson.
2. Wednesday, 25th – **Campbell's Farm**. Leader: Richard Bland.
July: Wednesday, 16th – **Marshfield**. Leader: Paul Farmer.
September: Saturday, 13th – **Chew Valley Lake**. Leader: Mike Johnson.
October: Sunday, 12th – **Migration Watch, Aust**. Leader: Richard Bland.
November: Sunday, 16th – **Cheddar Reservoir**. Leader: Mike Johnson.
December: Sunday 14th – **Severnside**. Leader: Giles Morris.

Winter Talks (5)

- January: 8th – Robin Prytherch: **The Buzzard**
(+ 16th – BOC meeting, **Birding, Twitching & Photography**.
February: 12th – Ken Hall: **Bird Watching and Conservation In France**.
March: 12th – Alex Rhodes: **Fair Isle – the Fairest of Isles**.
October: 8th – Chris Sperring: **The Rise and Fall of the Barn Owl**.
November: 12th – Roger Dickey: **Ascension Island**.
(Farmland Birds was originally advertised. Speaker: Eve Tigwell was forced to postpone.)

Fieldwork

- BTO Winter Thrush Survey
Breeding Bird Survey (for BTO and The Local Group)
Local Winter Garden Bird Survey (41st Year)
Swift Survey
BioBlitzes (Various)
Bristol99 Project with the BNHC
Steepleholme Centenary Visit

Lesley Cox, Hon. Sec. Ornithology Section

e) Reading Group Annual Report 2014

The group read six books, all with a natural history basis and some members were stimulated to explore works on similar themes by the same authors or others.

The Ptarmigan's Dilemma by John and Mary Therberge on Canadian wildlife, with *Paradise Found* by Steve Nicholls, *The Snow Geese* by William Fiennes and *The Snow Goose* by Paul Gallico following on.

The Map that Changed the World by Simon Winchester is the life of William Smith the inventor of geological mapping, with *The Floating Egg* by Roger Osbourne and *The Great Devonian Controversy* by Martin Rudwick exploring similar themes.

The Secret Life of Trees by Colin Tudge, with *Beechcombings* by Richard Maybey and *The Consolations of the Forest* by Sylvain Tesson exploring philosophy*and woodland.

The Life of the Fly by Jean Henri Fabre, with *A Sting in the Tail* by Dave Gourlay, *Dancing Bees* by Karl von Frisch and recommendations to read other volumes by J H Fabre.

Endless Forms Most Beautiful by Sean Carroll, on evolutionary development, proved to be 'challenging'.

Nature Tales – encounters with Britain's Wildlife, a collection of pieces from 48 authors, with reading about Richard Jefferies' life and work, and Gilbert White, *The Natural History of Selborne*.

Tony Smith

f) Society Talks

Five Society talks were held during 2014. In January, Jon Martin told us about *The Dragonflies of the Bristol Region* which drew upon the latest (4th) volume in the series of books about the area's wildlife published by The Bristol Regional Environmental Records Centre. In February, Gordon Young, showed a film called *The Avon Gorge*, which was followed by a range of questions and anecdotes on the perils of film making, whilst October saw the hidden variations of character, history and habitat embodied within Leigh Woods being described by Bill Morris.

November took us to our friends at the Museum to take advantage their Winter Lecture programme. Robert Massey, Deputy Executive Secretary of the Royal Astronomical Society, explained the benefits and deficits experienced by the inhabitants of the Blue Planet arising from *Comets, Asteroids and Crashes*.

December brought us back to earth when John Walters highlighted the huge variety of wildlife living and visiting Devon, with some stunning photographic evidence of the behaviour of the Heath Potter Wasp.

Lesley Cox

g) Report of the Society Walking Group for 2014

Eleven walks were achieved and enjoyed this year with one cancellation at Tickenham due to bad weather. We visited, in order, Winterbourne and the Bradley Brook, Clevedon, Midford and the Somerset Coal Canal (looking like a canal for the first time in many years due to the excessive rain previously), a circuit of Ashton Court including the towpath and the Nightingale Valley, Old Sodbury and the Cotswold Way, Keynsham and the River Avon (with so much botanical and entomological interest that we only managed to walk two fields before having to turn back to be in time for lunch!), Dolebury Woods and Churchill, Doynton and the River Boyd, Wavering Down on National Poetry Day with perfect weather, the Dundry circuit with Wax Cap fungi and Giant Puffball and finally Littleton-upon-Severn where hardly any recommendations to the South Glos Footpath Officer for improvements to stiles had been carried out from last time and it took a second reccc to find a good route without stiles.

These walks are an opportunity for members and others to share their natural history knowledge. My thanks go to those whose various botanical, ornithological and entomological skills helped to produce lists of interesting species.

Tony Smith

Links With Other Organisations.

In addition to the associations already mentioned, our link the University of Bristol grew stronger through preparations for a Bursary Grant Scheme to be delivered in January 2015. The BNS will supply an agreed amount of money to the University, which will be used to fund individual University of Bristol School of Biological Sciences Students to attend identification courses administered by the Field Studies Council. The Society and the University of Bristol are deeply indebted to Barry Harper, whose generous legacy enabled the development of the Barry Harper Bursary Fund. Plans for a similar funding of an educational facility concerning Natural History within Bristol Museum is also being discussed.

Membership

At the close of 2014 membership stood at 432. Sadly some very old friends were lost to us to whom proper tribute will be paid in the *Proceedings*. Although technically some losses fall into 2015, these old friends deserve recognition now:

Mrs. Margaret Silcocks who joined the BNS in 1960; Mr. Neville Lusmore (1959); Mrs. Beryl Rideout (1989) and Mr. Jonathan King (1996). Our condolences go to all their families and friends.

Thanks

The Society is grateful for the help and support it receives from the Earth Sciences Department, University of Bristol and to Ms. Laura Pye, Director of Museums, Galleries and Archives, Bristol City Council for continued support of the Society Library located within the City Museum and Art Gallery. It is also grateful to all those members of the Society who give so willingly of their time and energy in the course of the year to support the aims and aspirations of the Society.

The Society would like to congratulate Eileen Stonebridge on being awarded the British Empire Medal.

Lesley Cox, Hon. Sec. BNS.

BRISTOL NATURALISTS' SOCIETY

Statement of Financial Activities for the Year ended 31 December 2014

	<u>2014</u>	<u>2013</u>
INCOME (Incoming resources)		
Membership Subscriptions	7283.50	7582.00
Gift Aid	1493.30	1491.96
Donations	506.50	510.00
Trading	142.30	288.30
Interest Received	348.45	212.98
Miscellaneous		79.00
Total	9,774.05	10,164.24
 EXPENDITURE		
(A) Direct Charitable		
Meetings (Room Hire & Speaker Costs)	1,183.70	1,285.50
Books & Periodicals (Library)	846.12	632.63
Nature in Avon (Proceedings)	2,235.00	1,540.00
Avon Bird Report	1,400.00	1,600.00
Bulletin Production	1,384.18	1,322.01
Publications Distribution Costs	2,053.50	1,636.09
Subscriptions to other Organisations	83.00	83.00
Publicity	1,111.93	579.80
Total	10,297.43	8,679.03

	<u>2014</u>	<u>2013</u>
(B) Administration		
Print & Stationery	110.72	77.87
Postage & telephone	68.30	49.00
Council Meetings (Room Hire)	270.00	270.00
Insurance	102.38	125.87
Miscellaneous	77.37	1,095.85
Total	628.77	1,618.59
 <u>Operating Surplus (Deficit)</u>	 <u>-1,152.15</u>	 <u>-133.38</u>
 Grants Awarded	 2,490.35	 6,250.00
Grants Received	6,000.00	
Bequests		125,500.00
 <u>Funds movement</u>	 <u>2,357.50</u>	 <u>119,116.62</u>

Balance Sheet as at 31 December 2014

	<u>Notes</u>	<u>2014</u>	<u>2013</u>
ASSETS			
Current Assets			
Prepayments	1	664.66	804.66
Bank (Lloyds)		75,699.15	123,598.40
CAF Gold	3	3,563.70	3,550.80
CAF Platinum	4	78,980.84	28,645.29
		158,908.35	156,599.15
LIABILITIES			
Creditors			
Subscriptions Received in Advance		248.50	625.00
Accruals	2	328.20	
		576.70	625.00
Total Assets less Total Liabilities		<u>158,331.65</u>	<u>155,974.15</u>
CAPITAL			
General Fund 31/12/2013		155,974.15	155,974.15
Net income 2014		2,357.50	
Quartet Community Fund (RESTRICTED)		6,000.00	
Barry Harper Memorial Fund (UNRESTRICTED)		125,000.00	
General Fund 31/12/2014	5	27,331.65	
		<u>158,331.65</u>	<u>155,974.15</u>

Notes

1	Prepayments		
	Meeting Room Hire	390.00	
	Insurance	42.66	
	Periodicals	232.00	
			664.66
2	Accruals		
	Meetings (Speaker fee)	120.00	
	Library (Books Purchase)	118.20	
	Room Hire (Council Meetings)	90.00	
			328.20
3	CAF Gold		
	Opening Balance	3,550.80	
	Interest Received	12.90	
	Transfer from Lloyds	50,000.00	
	Transfer to CAF Platinum	-50,000.00	
	Closing Balance		3,563.70
4	CAF Platinum		
	Opening Balance	28,645.29	
	Interest Received	335.55	
	Transfer from CAF Gold	50,000.00	
	Closing Balance		78,980.84
5	General Fund		
	Bank (Lloyds)	75,699.15	
	CAF Gold	3,563.70	
	CAF Platinum	78,980.84	
	Barry Harper Memorial Fund	-125,000.00	
	Quartet Community Fund	-6,000.00	
	Prepayments	664.66	
	Creditors	-576.70	
			27,331.65

Instructions for authors

The editor welcomes original papers or short notes on the natural history of the greater Bristol region for consideration for publication in *Nature in Avon*.

Text should be submitted by email in Word. The data for graphs should be sent in Excel, separately from the graph, as graphs may have to be recreated to fit the page size of the journal. Illustrations should be submitted in .jpg format by email. Deadline dates for submitting copy will be published in the BNS Bulletin.

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Rerum cognoscere causas – Virgil

Cover: Liesegang Rings – Richard Ashley

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